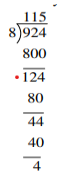
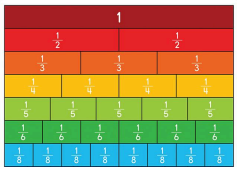
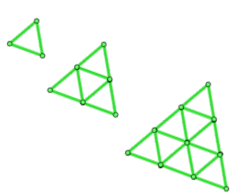
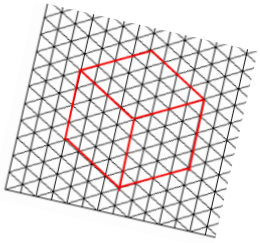
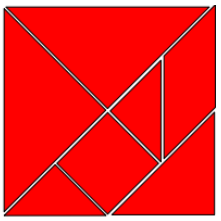
LET US UNDERSTAND MATHEMATICS-CLASS 4

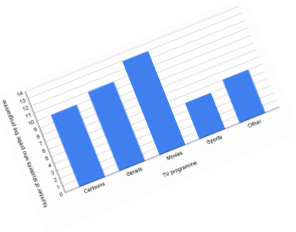












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PREFACE

This is part of a revised series of books based on research on the teaching of mathematics for class 4 in India earlier published on www.vidyaonline.net. This covers the NCERT syllabus for class 4.

The focus here is on laying a foundation for further learning of mathematics and understanding of concepts and procedures. Concepts are presented by videos, manipulatives, pictures, real-world situations, spoken and written words, and symbols. Automaticity (answering without thinking) of multiplication and division facts are emphasized. The teachers should provide more practice if necessary for mastery of the concepts, and procedures and use situations for exercises that are familiar to the children in the class.

Ample opportunities are provided for applications of mathematics to real-world situations, reasoning, communication, and problem solving.

The schools that can afford should provide concrete manipulatives such as counters, geometrical models, tangram pieces, blocks, geoboards, balances, fraction pieces, graphs, scissors, ropes.

The schools that cannot afford teachers and/or students can make some of these and improvise for others. For example, they can make tangram pieces, 3-D models, balance, use dot paper for Geoboard, draw small circles for counters, use fraction chart for fraction pieces.

Some activity sheets are provided that can be removed and used.

Answers to selected exercises are provided.

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UNIT 1

Number from 1,000 to 1,00,000

Review of numbers up to 1000

The teacher can give the pretest given in Appendix 1 to ensure that students have mastery of numbers 1-999.

Four-digit numbers

We have learned to write all numbers from 1 to 999. Recall that the numbers in order increase by 1.We use only digits from 0-9 and more places for larger numbers.
When do we need another place?
The largest one-digit number is 9 and 1 more than 9 is 10 and requires two places-ones place and tens place.
The largest two-digit number is 99 and 1 more than 99 is 100 and requires three places-ones place, tens place, and hundreds place.
What is the largest three-digit number? (999)
The next number 1 more than 999 requires another place and name for that place. It is called a **thousands place** and is written to the left of hundreds place. The number that comes just after 999 is 1000. The numbers that come after 1000 in order are 1001, 1002, 1003, 1004, and so on.

Reading four-digit numbers

We add a comma after the number in thousands e.g. 4,273. The number before the comma in this case 4 tells us about the thousands. We read the number as 4 thousand followed by the name of the three-digit number together. Thus the number 4,273 would be read as four thousand two hundred seventy-three. Similarly, we would read 3,824 as three thousand eight hundred twenty-four; 9,270 as nine thousand two hundred seventy; 3,201 as three thousand two hundred one. If the number of hundreds is zero as in 9,063, we read it as nine thousand sixty-three. If the number of both hundreds and tens is zero as in 4,007, we read it as four thousand seven

Writing four-digit numbers given in words in figures

If the numbers are given in words, we proceed as follows to write them in figures:

We write the number beginning with thousands followed by a comma and then the three-digit number remembering to write the zero in hundreds place for a two-digit number and both in hundreds and tens place for a one-digit number, and in hundreds, tens and ones place for a number that has thousands only. For example, we write

seven thousand in figures as 7,000

four thousand three hundred seventy-six in figures as 4,376.

eight thousand two hundred in figures as 8,200

seven thousand forty-three in figures as 7,043.

nine thousand six hundred four in figures as 9,604.

six thousand one in figures as 6,001.

Note that all numbers from one thousand up to nine thousand nine hundred ninety-nine should have four digits, some of which except the first one may be zeros.

The expanded form of four-digit numbers

The expanded form of four-digit numbers can be written like three-digit numbers by including the number of thousands at the beginning. For example,

4,763 = 4 thousands + 7 hundreds + 6 tens + 3 ones

5,708 = 5 thousands + 7 hundreds + 0 tens + 8 ones

8,024 = 8 thousands + 0 hundreds + 2 tens + 4 ones

9,007 = 9 thousands + 0 hundreds + 0 tens + 7 ones

8,000 = 8 thousands + 0 hundreds + 0 tens + 0 ones

We can also make a **place value chart for writing four-digit numbers** e.g. 4,763, 5,708, 8,024, 9,007, 8,000.

Thousands	hundreds	tens	ones
4	7	6	3
5	7	0	8
8	0	2	4
9	0	0	7
8	0	0	0

The first row gives the names of **places of different digits**.
The **place values of different digits** depend on their place.
Place value of a digit in the ones place is as many ones as the digit.
Place value of a digit in a tens place is as many tens as the digit.
Place value of a digit in a hundreds place is as many hundreds as the digit.
Place value of a digit in a thousands place is as many thousands as the digit.
For example for the number 4,763
3 is in the ones place, its place value is 3
6 is in the tens place, its place value is 6 tens or 60
7 is in the hundreds place, its place value is 7 hundred or 700
4 in the thousands place, its place value is 4 thousand or 4000.
Writing in a place value chart is helpful for writing four-digit numbers as it draws our attention to the use of 0 as a placeholder if there are no ones, tens, or hundreds.

Exercise 1.1

1. Read the following numbers:
   467; 703; 270; 1,000, 4,667; 2,578; 1706; 1,089; 6,980; and 4,005.
2. Make a place value chart and write the numbers (to be dictated by the teacher) in the chart.
   (a) 7,492 (b) 5,791 (c) 1,803 (d) 3,765 (e) 3,089
   (f) 4,008 (g) 789, (h) 903 (i) 4,082 (j) 5,006
3. Write the following numbers in figures:
   (a) Seven hundred forty-three
   (b) Six hundred eight
   (c) Four thousand
   (d) Three thousand seven hundred fifty-seven
   (e) Eight thousand three hundred sixty-four
   (f) Two thousand four hundred six
   (g) Nine thousand nine
   (h) Seven thousand eighty-five
   (i) Three thousand one
   (j) One thousand seven hundred eight
4. Write the following numbers in words:
   (a) 67 (b) 853 (c) 702 (d) 2,894 (e) 9,704
   (f) 6,009 (g) 8,056 (h) 1,890 (i) 7,052 (j) 4,005
5. What comes just after the following numbers?
   (a) 1,005 (b) 6,734 (c) 9,999 (d) 2,009 (e) 999
6. What comes just before the following numbers?
   (a) 500 (b) 4,687 (c) 2,000 (d) 3,260 (e) 4,500
7. Write the numbers given below in standard form:
   (a) 4 Thousands + 3 hundreds + 2 tens + 7 ones = 4,327
   (b) 8 Thousands + 7 hundreds + 0 tens + 5 ones
   (c) 3 Thousands + 0 hundreds + 4 tens + 0 ones
   (d) 9 Thousands + 5 hundreds + 0 tens + 6 ones
   (e) 2 Thousands + 6 hundreds + 9 tens + 0 ones
8. Write the expanded forms of the numbers given below:
   (a) 6,952 (b) 8,478 (c) 5,089 (d) 6,703 (e) 4,002

9. Write the numbers given below in standard form:
   (a) 500 + 40 +8
   (b).7000 + 600 + 30 + 4
   (c) 8000 + 40 +3
   (d) 9000 + 8
10. Name the digit in the places specified for numbers given below:
   (a) ones place in 1,980
   (b) thousands place in 6,871
   (c) hundreds place in 8,453
   (d) tens place in 5,672
11. Write the place value of the underlined digit in the following numbers:
   (a) 6,3<u>8</u>7 (b) 8,65<u>4</u> (c) <u>2</u>,483 (d) 7,<u>4</u>69 (e) <u>8</u>,462
   (f) 5,8<u>0</u>4 (g) <u>1</u>,964 (h) 4,<u>8</u>26 (i) <u>3</u>,659 (j) 78<u>0</u>
12. Write numbers whose digits in different places have the following values:
   (a) Digit in hundreds place is 7, the digit in tens place is 1, and digit in ones place is zero
   (b) Digit in the thousands place is 8, the digit in hundreds place is 0, the The digit in tens place is 7 and the digit in the ones place is eight

Five digit numbers

The largest four-digit number is 9,999; the next number 1 more is 10,000, it requires one more place to the left of thousands place, which is called **ten thousands place.**

Reading five-digit numbers

The number in ten thousands place is written before the thousands number e.g. 25,687. The number before the comma 25 in this case also tells us about the thousands and we read it as in two-digits numbers that is twenty-five thousand followed by the number as in three-digit numbers. This number would thus be read as twenty five thousand six hundred eighty-seven. Similarly, we would read 53,864 as fifty-three thousand eight hundred sixty-four, 30,276 as thirty thousand two hundred seventy-six; 94,048 as ninety-four thousand forty-eight; 60,003 as sixty thousand three and 40,050 as forty thousand fifty.

Writing five-digit numbers given in words

We write these as four-digit numbers except here thousands are two-digit numbers. For example, we would write the numbers given below as follows:

Forty thousand-40,000

Twenty-three thousand five hundred sixty four-23,564

Seventy thousand nine hundred twelve-70,912

Eighty thousand forty-80,040

Sixty thousand four-60,004

Note-All numbers from 10,000 up to 99,999 must have five digits, some of which except the first one may be zeros.

The expanded form of five-digit numbers

The expanded form of five-digit numbers can be written in a manner similar to four-digit numbers by including the number of ten thousands in the beginning e.g.

24,687 = 2 ten thousands + 4 thousands + 6 hundreds + 8 tens + 7 ones

53,864 = 5 ten thousands + 3 thousands + 8 hundreds + 6 tens + 4 ones

19,695 = 1 ten thousands + 9 thousands + 6 hundreds + 9 tens + 5 ones

30,276 = 3 ten thousands + 0 thousands + 2 hundreds + 7 tens + 6 ones

94,048 = 9 ten thousands + 4 thousands + 0 hundreds + 4 tens + 8 ones

60,003 = 6 ten thousands + 0 thousands + 0 hundreds + 0 tens + 3 ones

40,050 = 4 ten thousands + 0 thousands + 0 hundreds + 5 tens + 0 ones
We can also make a **place value chart for writing five-digit numbers** by including a column of ten thousands to the left of the thousands column. The numbers 24,687; 53,864; 19,695; 30,276; 94,048; and 60,003 may be written in this chart as follows:

Ten thousands	Thousands	hundreds	tens	ones
2	4	6	8	7
5	3	8	6	4
1	9	6	9	5
3	0	2	7	6
9	4	0	4	8
6	0	0	0	3

Note that a place value chart is another way of writing an expanded form of writing five-digit numbers. Henceforth, we will use a place value chart only as it is more compact and draws our attention to the use of 0 as a placeholder if there are no ones, tens, hundreds, or thousands.

Some generalizations about numbers

1. Numbers increase in order by 1.
2. Any number however large can be written using digits 0-9 by using the concept of place value.
3. We need another place for the next number when all the digits in a number are 9. That place is given a name and added to the left of the existing places.
4. Any place always has a place value ten times the place value of the place next to its right.

Exercise 1.2

1. Read the following numbers:
   1,089, 6,980; 4,005; 24,589; 53,607; 84,790, 40,693; 70,068; 50,000; 16,005; 60,761
2. Make a place value chart for writing five-digit numbers and write the following numbers (to be dictated by the teacher) in it
   (a) 35,892 (b) 24,701 (c) 67,089 (d) 84,005 (e) 56,000
   (f) 48,007 (g) 96,806 (h) 5,789 (i) 12,984 (j) 72,064
3. Write the following numbers in figures:
   (a) Twenty-five thousand four hundred sixty-seven
   (b) Forty-three thousand six hundred ninety-five
   (c) Sixty thousand two hundred forty-seven
   (d) Thirty-three thousand seventy-five
   (e) Fifty-eight thousand four hundred five
   (f) Eighty thousand seven
   (g) Ninety thousand
4. Write the following numbers in words:
   (a) 78,583 (b) 14,851 (c) 67,908 (d) 54,064 (e) 48,007
   (f) 30,000 (g) 70,005 (h) 24,006 (i) 14,078 (j) 50,786
5. What comes just after the following numbers?
   (a) 24,000 (b) 56719 (c) 43499
   (d) 64,999 (e) 39,999 (f) 56,847
6. What comes just before the following numbers?
   (a) 100 (b) 45,675 (c) 78,780
   (d) 66,800 (e) 34,000 (f) 50,000
7. Write the name of the digit in the place specified for the numbers given below:
   (a) tens place in 25,687
   (b) ones place in 15,398
   (c) thousands place in 56,587
   (d) hundreds place in 48,465
   (e) Ten thousands place in 73,892
8. Write the place value of the underlined digit in the following numbers:
   (a) 46,<u>8</u>93 (b) 6<u>9</u>,094 (c) 28,95<u>3</u>

(d) 7$\underline{0}$,882 (e) 58,$\underline{3}$49 (f) $\underline{9}$4,827

(g) $\underline{1}$4,695 (h) 23,7$\underline{4}$1 (i) 56,$\underline{8}$04

9. Give examples of situations in daily life where you find
   (a) One-digit numbers
   (b) Two-digit numbers
   (c) Three-digit numbers
   (d) Four-digit numbers
   (e) Five-digit numbers

Comparison of numbers

You may recall that the digits in different places have different values. The first digit on the right is in ones place has the value 1 and its value is the same as the digit. The digit on its left is in tens place has the value 10 and its value is as many tens as the digit. The digit to the digit on the left of the tens place is in the hundreds place has the value 100 and its value is as many hundreds as the digit and so on. The number is equal to the sum of all these values.

We can compare numbers by either remembering the number that came earlier in counting is less than the number that came later in counting or by looking at the digits.

If the number of digits is different in the two numbers, the number with larger number of digits is greater than the one that has fewer digits, for example, 45 > 8; 674 > 89; 5,234 > 687; 25,781 > 8,629; 1,67,903 > 98,528.

If the two numbers have the same number of digits, we first look at the digit in the place with the highest value in the two numbers, if these are different than the number in which this digit is larger is greater than the number in which the digit in that place is smaller. For example, 456 > 278, 7835 > 6839, 56,982 > 40,789, 4,56,891 > 2,89,461.

If the digits in this place are the same in both numbers, then we compare the digits in the next place. If these are different, the number in which the digit in this place is larger is greater than the number in which the digit in this place is smaller, for example, 247 > 228, 7478 > 7259, 45,789 > 42,986.

If the digit in the leftmost place, as well as the place next to it, are the same in both numbers, then we compare the digits in the next place. If these are different, the number in which the digit in that place is larger is greater than the number in which the digit in that place is smaller, for example, 783 > 782, 9437 > 9419, 56,984 > 56,789. If the numbers have more than two digits beginning from the left the same, consider the digits in the next place that are different, the one with a larger value is larger than the other, and so on. If the digits in all places are the same in both numbers, then the two numbers are equal.

For example, 658 = 658; 7,495 = 7,495; 23,467 = 23,467.

Exercise 1.3

1. Compare the following numbers by writing >, <, or = between numbers:
   (a) 678 ____ 89
   (b) 2,457 ____793
   (c) 4,569 ____4,584
   (d) 78,952 ____63,763
   (e) 48,649 ____48,798
2. Arrange the following numbers from smallest to largest:
   (a) 25, 67 and 30
   (b) 462, 8, 73, 760
   (c) 546 ; 8,531; 4,906
   (d) 4,785; 4,794; 34,762
3. Arrange the following numbers from largest to smallest:
   (a) 58, 78, 23
   (b) 567, 349, 782
   (c) 9,432; 25,873; 45,982
   (d) 67,413; 85,329; 85,964
4. Write the smallest four-digit number
5. Write the largest five-digit number
6. Write the smallest number using digits 6, 3, 9, and 2. Use each digit once only.
7. Write the largest number using digits 4, 8, 5, and 2. Use each digit once only.
8. Write all the numbers using digits 4, 2 and 9

UNIT 2

Addition and Subtraction of Multiple Digit Numbers

Addition of four-digit numbers

Show the video: https://youtu.be/mAvuom42NyY?t=309

Four-digit numbers can be added in a manner similar to three-digit numbers except for an additional step of the addition of thousands.

To add four-digit numbers

1. Write the numbers so that ones place, tens place, hundreds place, and thousands place of all the numbers are aligned. Note if ones place of the two numbers are aligned, all others will be aligned. Draw a line below that to write the sum.
2. Add up to hundreds as for 3-digit numbers. If the sum of hundreds is less than 9, write in hundreds place for the sum. If the sum of hundreds is more than nine, rename it as thousands and hundreds Write the hundreds in hundreds place in the sum and thousands above thousands place to remind us to add it while adding the thousands
3. Add the thousands. If the sum of thousands is less than nine, write it in thousands place in the sum. If the sum of thousands is more than nine, rename it to ten thousands and thousands and write the thousand in the thousands place and ten thousands in the ten thousands place in the sum.

Example 1

```
  1 1 1
  3,467
+ 4,678
--------
  8,145
--------
```

1. Adding the ones, we have 15 ones. As it is more than 9, we rename it as 1 ten and 5 ones. Write the 5 in ones column in the sum and 1 in the tens column above the numbers.
2. Adding the tens, we have 14 tens. As it is more than 9, we rename it as 1 hundred and 4 tens. Write the 4 in tens column in the sum and 1 in hundreds column above the numbers.

3. Adding the hundreds, we have 11 hundreds. As it is more than 9, we rename it as 1 thousand and 1 hundred. Write the 1 in hundreds column in the sum and 1 in thousand in thousands column above the numbers.
4. Adding the thousands we have 8 thousands and write 8 in thousands column in the sum.

For adding numbers with different digits remember to align the numbers in the ones place.

Example 2

```
  1 1
 2,592
+  735
--------
 3,327
--------
```

Exercise 2.1

1. Fill in the blanks:
   15 hundreds = ____Thousands + ___ hundreds
   10 hundreds = ____Thousands + ___ hundreds
2. Write the numbers given below in vertical form for addition so that different places e.g. the ones place, tens place, hundreds place, thousands place, and ten thousands place of all the numbers are aligned and add them.
   (a) 123+56 + 7
   (b) 56 + 475 + 2,835
   (c) 34 + 659 + 2,432
3. Add

Th H T O	Th H T O	Th H T O
(a) 3, 5 4 8	(e) 4, 6 4 6	(i) 6, 5 4 7
+4, 4 3 1	+3, 2 8 7	7, 5 2 4
----------	----------	+1, 2 6 9
- ----------	----------	----------
(b) 6, 2 5 7	(f) 3 4 5 6	----------
+2, 4 4 4	+3 8 7 8	(j) 7, 3 5 8
----------	----------	+1, 5 4 2
----------	----------	----------
(c) 3, 6 5 3	(g) 2, 1 0 3	----------
+4, 3 8 9	+1, 8 0 6	(k) 4, 2 0 7
----------	----------	+4, 5 8 2
----------	----------	----------
(d) 5, 5 4 7	(h) 7 8 0 3	----------
+2, 5 6 8	+ 5 0 8	
----------	----------	
----------	----------	

Subtraction of four-digit numbers

Show the video: https://youtu.be/Y6M89-6106I
We can subtract four-digit numbers like three-digit numbers with an additional step of renaming one thousand as 10 hundreds if the number of hundreds to be subtracted is more and subtracting the thousands.
To subtract four-digit numbers

1. Write the number from which a number is to be subtracted first. Write the number to be subtracted below that aligning the ones. We may write Th for ten thousands, H for hundreds, T for tens, and O for ones above the numbers. Draw a line below the numbers to write the difference.
2. Subtract numbers up to hundreds as in three-digit numbers.
3. Look at hundreds, if the number of hundreds to be subtracted is less than or equal to the number of hundreds in the number from which it is to be subtracted, subtract it.
   If the number of hundreds to be subtracted is more than the number from which it is to be subtracted, rename 1 thousand as 10 hundreds and add that to hundreds. Correct the thousands and write 1 before hundreds place to remember that there are 10 more hundreds in the hundreds place. Subtract the hundreds from hundreds and write it in hundreds place below the line in the hundreds place.
4. Subtract the thousands from thousands and write it in thousands place below the line in the thousands place
   Example 3
   Subtract 3,448 from 7,523.
   Write 7,523 and 3,448 below that and align the ones, tens, hundreds, and thousands places. Draw a line below the numbers.

```
   Th H T O
        1
      4 1 1
    7, 5 2 3
  - 3, 4 4 8
  ------------
    4, 0 7 5
  ------------
```

1. As the number of ones to be subtracted is more than 3, we rename(borrow) 1 ten as ten ones and correct the tens and ones, and write 1 in the tens place and write 1 above and to the left of 3, so that we remember that we now have 13 in ones place. Then subtract the 8 ones from 13 ones, we get 5. Write 5 under the line in the ones place.
2. We next look at tens, as 4 tens are to be subtracted and we have only 1 ten, we rename 1 hundred as 10 tens and add that to 1 ten. We correct the hundreds and write 1 above and to the left of hundreds place so that we remember that now we have 11 tens. Subtracting 4 tens from 11 tens we get 7. Write 7 in tens place below the line.
3. Subtract 4 hundreds from 4 hundreds which gives 0, write it in hundreds place below the line.
4. Subtract 3 thousands from 7 thousands which give 4. Write it in the thousands place below the line.

Example 4

```
   2 1
     3  9 1
   3, 4 0 5
-  1, 5 6 8
------------
   1, 8 3 7
------------
```

1. As the number of ones to be subtracted is more than 5, we need to rename tens. However, as there are zero tens, borrow one ten from 40 tens and rename it as ten ones and reduce 40 tens by 1, so that we have 15 ones and 39 tens. Subtracting 8 from 15, we have 7 ones which we write in ones place below the line.

2. Then subtracting 6 tens from 9 tens, we get 3 tens which we write in tens place below the line.
3. Again we cannot subtract 5 hundreds from 3 hundreds, we rename 1 thousand as 10 hundreds so that we have 13 hundreds and reduce the number of thousands by one. Subtracting 5 hundreds from 13 hundreds, we get 8 which we write in the hundreds place.
4. Then subtracting thousands from thousand, we get one, which we write in the thousands place.

Example 5

```
  6  9 9 1
 ~~7, 0 0~~ 6
- 4, 2 5 8
-----------
  2, 7 4 8
-----------
```

As we have two zeros in the number, we may think of 700 as 699 tens and 10 ones, so that we have 699 tens and 16 ones and then subtract the numbers.

We now subtract the ones from ones, tens from tens, hundreds from hundreds, and thousands from thousands and write below the line in ones place, tens place, hundreds place, and thousands place in order.

Checking Subtraction

We can check if our subtraction is correct by adding the difference to the number that was subtracted; it should equal the number from which it was subtracted.

Example 6

```
  51
    21
      4 1                    Verification of the answer
 6, 3 5 8                      1, 7 8 9
- 4, 5 6 9                   +4, 5 6 9
  1, 7 8 9                     6, 3 5 8
```

Subtraction from hundreds

Subtraction of a number from hundreds can be carried out more easily than the short form algorithm by thinking of the number of tens in it and regrouping one ten as 10 ones.

Example 7

Subtract 367 from 700,

To subtract 367 from 700, we think of 700 as 70 tens = 69 tens + 1 ten = 69 tens and 10 ones, that makes the subtraction easier.

```
  691
 700
- 367
-------
  333
-------
```

Subtraction from thousands

Subtraction of a number from thousands can be carried out more easily than the short form algorithm by thinking of the number of tens in it and regrouping it as 10 ones.

Example 8

Subtract 4,257 from 6,000

To subtract 4,257 from 6,000, we think of 6,000 as 600 tens = 599 tens +1 ten = 599 tens and 10 ones, that makes the subtraction easier.

```
  5 9 91
 6,000
- 4,257
---------
  1,743
```

Other computational ideas

In many cases, a method called **equal additions** can be used to make computations easier by adding the same number to both numbers that do not affect the difference.

For example 4 – 0 = 4

1f we add 1 to both the numbers we have 5 – 1 the difference 4 again.

1f we add 2 to both the numbers we have 6 – 2 the difference is 4 again.

1f we add 3 to both the numbers we have 7 – 3 the difference is 4 again.

Similarly, we can use **equal subtractions** to make computations easier by subtracting the same number from both the numbers that do not affect the difference.

For example 10 – 8 = 2

1f we subtract 2 from both the numbers we have 8 – 6 = 2 again.

1f we subtract 3 from both the numbers we have 7 – 5 =2 again.

We may use these methods in some cases to make computations easier.

Example 9

Find 1000 –598

If we add 2 to both numbers, we have,

```
  1,002
-   600
----------
    402
```

Or if we subtract 1 from both the numbers, we have

```
   999
- 597
---------
  402
--------
```

Both of which are easier to compute.

Exercise 2.2

1. Subtract the following mentally and tell how you got the answer:
   (a) 100 - 46 (b) 204 - 98 (c) 1,000 - 396
   (d) 700 - 198 (e) 500 - 245 (f) 203 - 98
2. Check the following answers by addition and mark an X against the wrong ones:
   (a) 6,742 - 3,894 = 3,152
   (b) 4,000 -345 = 4345
   (c) 5,000 - 4328 = 672
3. Subtract

Th H T O	Th H T O	Th H T O
(a) 8, 5 6 7	(e) 5, 0 6 8	(i) 5, 0 0 3
- 2, 4 3 3	-3, 2 7 4	-2, 7 4 5
----------	----------	----------
----------	----------	----------
(b) 9, 4 5 3	(f) 6, 0 0 0	(j) 6, 5 7 3
-4, 2 6 8	-3, 6 2 8	- 3, 4 2 1
----------	----------	----------
----------	----------	----------
(c) 4, 8 6 0	(g) 4, 5 3 2	(k) 6, 4 2 3
-3, 9 7 2	- 3, 2 2 8	-2, 5 7 4
----------	----------	----------
----------	----------	----------
(d) 8, 0 6 4	(h) 8, 1 4 3	(l) 7, 4 0 6
-6, 5 4 7	-6, 5 8 5	-5, 7 4 7
----------	----------	----------
----------	----------	----------

Estimation and judging reasonableness of answers

It is concerned with quickly estimating an approximate answer to computations arrived at by addition, subtraction, multiplication, and division of numbers. We generally do it by rounding off numbers to the nearest ten, hundred, thousand, etc., and then performing addition, subtraction, multiplication, and division as the case may be. If it is close to the answer arrived at by calculation, the answer is reasonable.
This is desirable even if you are using a calculator, because you may sometimes press the wrong key.

Rounding off the numbers to the nearest ten

For rounding off a number to the nearest 10, find two consecutive multiples of ten between which it lies and then round it off to the nearest multiple.
For example, 43 lies between 40 and 50. We can round it off to 40 as 43 is closer to 40 than 50. Similarly, 77 lies between 70 and 80. We round off 77 to 80 as it is closer to 80 than 70. If it is mid-way between the two multiples, round off to the higher multiple. For example, we will round off 25 to 30.

Rounding off numbers to nearest hundred

For rounding off a number to the nearest hundred, find two consecutive multiples of hundred between which it lies and then round it off to the nearest one. For example, 432 lies between 400 and 500. We round it off to 400 as 432 is closer to 400 than 500. Similarly, 367 lies between 300 and 400. We round off 367 to 400 as it is closer to 400 than 300.
If it is mid-way between the two multiples, round off to the higher multiple. For example, we will round off 450 to 500.

Rounding off numbers to nearest thousand

For rounding off a number to the nearest thousand, find two consecutive multiples of thousand between which it lies and then round it off to the nearest one. For example, 2,412 lies between 2,000 and 3,000. We round it off to 2,000 as 2412 is closer to 2000 than 3,000. Similarly, 6,789 lies between 6,000 and 7,000. We round off 6,789 to 7,000 as it is closer to 7,000 than 6,000.

If it is mid-way between the two multiples, round off to the higher multiple. For example, we will round off 4500 to 5000.

Estimation of sums and differences

If we do not have much time as in an examination, we can quickly estimate the answer to addition and subtraction questions by rounding to the nearest ten, hundred, or thousand whichever is appropriate.

Example 10

  63
+48

We can round off 63 as 60 and 48 as 50, so the sum should be close to 110. The exact sum is 111 close to it.

Example 11

  420
+567

In this case, we can round both the numbers to the nearest hundred to make a quick estimate. Number 420 can be rounded to 400 and 567 to 600, so the sum should be close to 1,000. The exact sum is 987 close to it.

Example 12

  5,853
+4,982

10,835

In this case, we can round both the numbers to the nearest thousand to make a quick estimate. Number 5,853 rounded to the nearest thousand is 6000 and 4982 to 5000, so the sum should be close to 11,000. The exact sum is 10,835 close to it.

Example 13

Subtract 2,943 from 7,694

We can round 2,943 to 3000 and 7,694 to 8,000, the difference should be about 5,000. The exact difference is 4,751 close to 5,000.

Exercise 2.3

1. Round off the following numbers to the nearest ten.
   (a) 36
   (b) 42
   (c) 367
   (d) 550
2. Round off the following numbers to the nearest hundred.
   (a) 223
   (b) 550
   (c) 687
   (d) 1,357
   (e) 2,515
3. Round off the following numbers to the nearest thousand.
   (a) 2,773
   (b) 4,217
   (c) 2,687
   (d) 41,357
   (e) 72,715
4. Estimate the following to the nearest ten:
   (a) 42 + 67 (b) 29 + 38 (c) 68 – 42
5. Estimate the following to nearest hundred:
   (a) 324 + 161 (b) 984 - 392 (c) 825- 347
6. Estimate the following to nearest thousand:
   (a) 5,843 + 6,325 (b) 8,512 + 4,879
   (c) 6,435 - 2,789 (d) 17,856 - 9,902

Use of Parentheses

Some situations require both addition and subtraction. For example, you bought a book for 35 rupees and notebooks for 20 rupees. The shopkeeper asks you to give him 55 rupees. As you do not have exact change you give him a hundred-rupee note; then he subtracts 55 from hundred to find the amount he should return to you. The mathematical equations for this would be

Rs. (35 + 20) = Rs. 55

Rs.(100 – 55) = Rs. 45

We can also write both the transactions in one mathematical expression as

Rs. 100 – (35 + 20)

The use of parentheses indicates that the expression within brackets is to be simplified first and then the remaining expression.

For example, to simplify 100 – (35 + 20), we first compute 35 + 20 and then subtract the result from 100.

Exercise 2.4

1. Find
   (a) 10 –(4 + 3) =
   (b) 100 – 37 =
   (c) 45 –(15 + 7) =
   (d) 450 – 100 – 245 =
   (e) 100 –(25 + 42) =
2. Use parentheses in the following number sentences so that they will be true statements.
   (a) 10 – 2 +4 = 4
   (b) 50 – 12 + 16 = 22
   (c) 45 – 22 + 4 = 27
   (d) 100 – 37 – 10 = 53
   (e) 500 – 67 + 42 = 391
3. Ramesh bought a toy for 120 rupees and a ball for 15 rupees. If he gave the shopkeeper 150 rupees, how much money should the the shopkeeper return to him?
   (a) Write a mathematical expression to find how much money should the shopkeeper return to him?
   (b) Solve it.
4. A school had 1234 students. At the end of the year, 75 left school, and 135 new students joined the school.
   (a) Write a mathematical expression to find out how many students are there in school now?
   (b) Find the number of students in the school now.
5. A bus had 40 passengers. At the next bus stop, 5 got down and 7 got on the bus.
   (a) Write a mathematical expression to find out how many passengers are on the bus now?
   (b) Find the number of passengers on the bus now.

UNIT 3

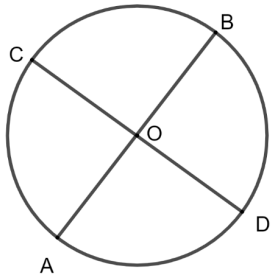
Geometry

Circle

We find many things in our environment that have a circular shape e.g. the face of some clocks, bangles, a five-rupee coin, a CD. We can draw a circle with the help of these by drawing around these.
A circle is a closed(if you start from a point, you can come back to the same point going around it without lifting your pencil)2-D shape that is composed of a curved line.

Activity 3.1

Draw a circle with the help of any circular object. Cut and fold it so that the two parts cover each other completely, fold it again and open it. Point O where the two folds meet is called the **centre** of the circle. The line segments AB and CD formed by the fold are called **diameters**. The distance of any point on the circle from the centre O is called the **radius**. Line segments OA, OB, OC, and OD are all radii. Check **Any point on the circle is equidistant from the centre O.**



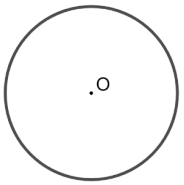
Activity 3.2

We can also draw a circle with the help of a pencil and string.
Pivot a string with a drawing pin and make a loop to hold a pencil at the other end. Holding the string taut to move it around. The figure drawn is a circle. Remove the pin and mark a point there. This point marks the centre of the circle.
Join the centre with different points on the circle. Measure the length of the line segments.

What do you notice about the length of line segments? (They are all equal.) Extend a line segment joining a point on the circle with the centre until it meets the circle again. Measure its length. What do you notice about its length? (It is equal to two times the radius).

Exercise 3.1

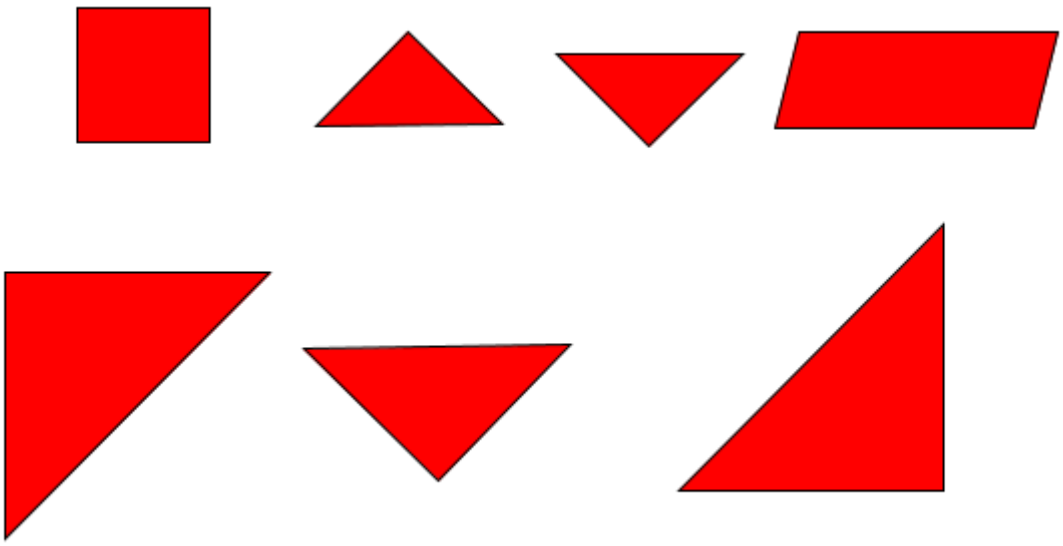
1. Give examples of models of circles in the environment.
2. Students of a class gave the following examples for models of a circle.
   (a) a ball (b) five rupee coin (c) an egg
   (d) a CD (e) face of some clocks (f) globe
   Which of these are correct
3. Trace the circle with centre O given below and draw and label in it a
   (a) radius (b) diameter



4. Draw a circle with the help of a circular object. Cut it and find its
   (a) diameter
   (b) centre
   (c) radius

Tangram

A tangram is an old Chinese puzzle and consists of seven tangram pieces.



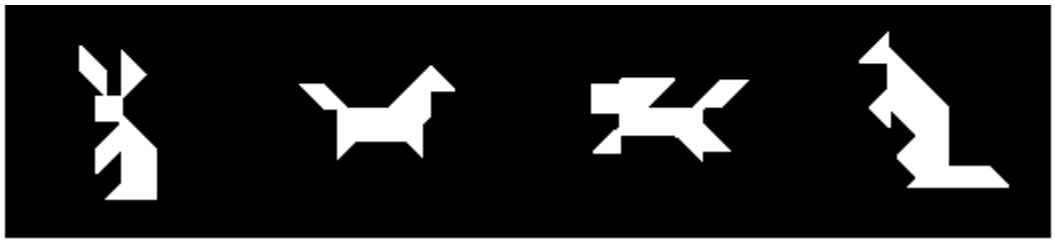
If plastic tangrams are not available, you can make these pieces by pasting the figure given in Activity Sheet 3.1 on cardboard and cutting the pieces.

Activity 3.3

Creating shapes with tangram pieces

Work in groups to make the following shapes with all seven pieces.

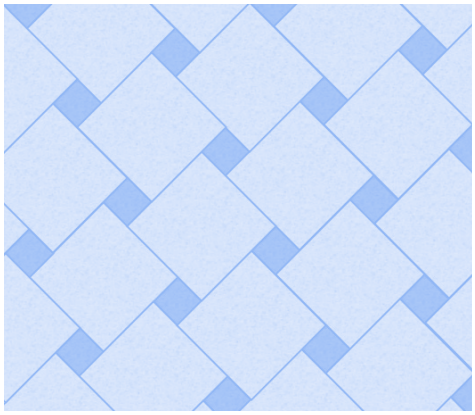
1. a square.
2. a triangle.
3. a rectangle.
4. a parallelogram.
5. animals
6. people

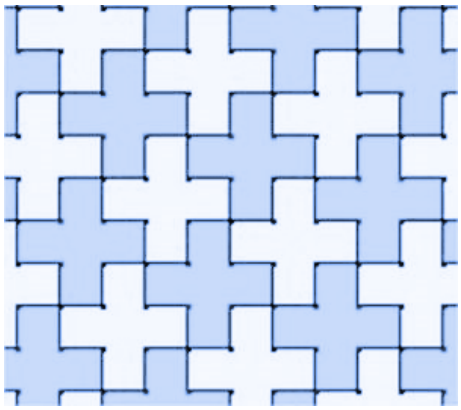


6. Make some new shapes and draw their outlines.
7. Fill in the outlines of shapes made by other students using all seven tangram pieces.

Tiling a region

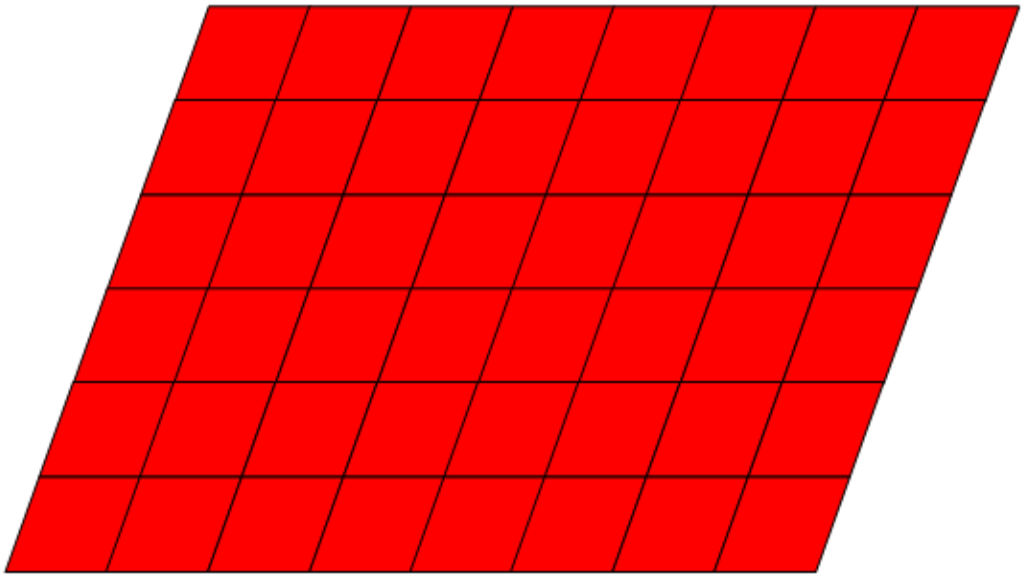
Tiling refers to filling a surface with shapes so that there are no overlaps or holes. It may not fill the corners.
You would have seen many floors with tiles. What shapes had been used for those?
Some tiled regions are given below.





Activity 3.4

To tile a page by a tangram piece, say parallelogram. Trace around the parallelogram. Slide the parallelogram horizontally so that one of its edges coincides with a side of the traced parallelogram and draw around it again. Continue until the end of the page. Then slide the parallelogram vertically and tile it. Continue in this manner until the page is tiled. It will look like the figure given below.

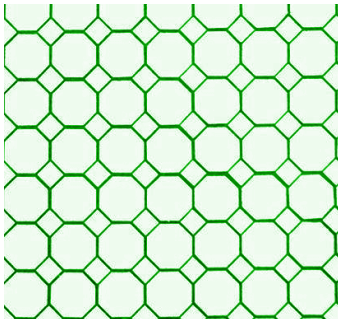


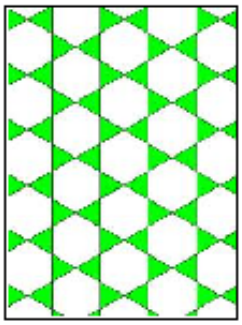
Tile a page by square tangram piece.
Tile a page by triangular tangram piece so that there are no gaps or overlaps? (You can flip, rotate and/or slide the triangular piece).
Can you tile a surface with circles? If yes, tile it, if no, why?
Can you tile a surface with ovals? If yes, tile it, if no, why?

Tiling a surface with two shapes

Activity 3.5

We can also tile a surface by using two or more shapes.

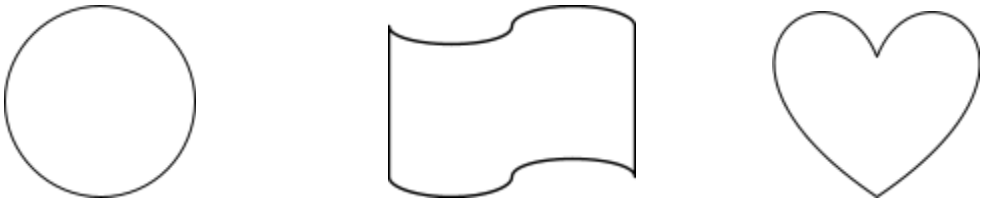




Cut on construction paper several copies of triangles, trapeziums, and hexagons given in Activity Sheet 3.2.
Tile a page by one or more of the shapes.

Perimeter

Show the video: https://youtu.be/AAY1bsazcgM?t=274
Distance around a figure or shape is called its perimeter.
We often need to find it in daily life e.g. if we want to stitch a lace around a table cloth, how much lace to buy.
If the figure is a polygon, that is a closed figure made up of line segments, it can be found by measuring the length of all the sides with a ruler and adding them.
The perimeter of curved and irregular shapes
If the shape is curved or irregular e.g. the shapes given below:

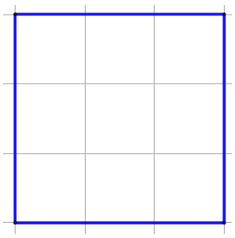


We cannot measure it with a ruler. However, we can mark a point on it and keep an end of a thin string or wool there, take it around the figure keeping it on the line until we come back to the same point. Cut the string or wool and measure the length of the string. That gives the parameter of the figure.
The parameter of a circle is called the **circumference of the circle.**

Area

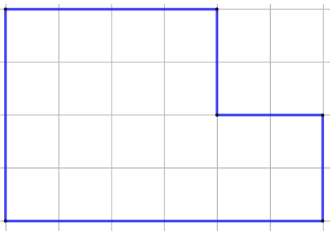
Show the video: https://youtu.be/_uKKl8R1xBM?t=16
Ask questions such as the following
Which wall would require more paint this or that?
Can I cover the entire table with this paper?
Can I write more on this paper or that?
Comparisons such as these will give an intuitive feeling of the area and comparison of areas.
We often need to find the area e.g. to find out how much sun mica to buy to cover a tabletop. We can find the area of a surface by covering it with squares whose side is 1 unit and count the number of squares.

For example, the areas of the figures given below are



9 unit^2

8 unit^2



20 unit^2

Where a small square is our unit of area.

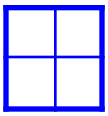
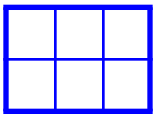
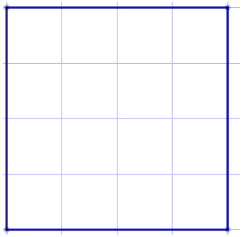
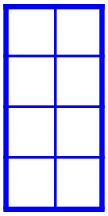
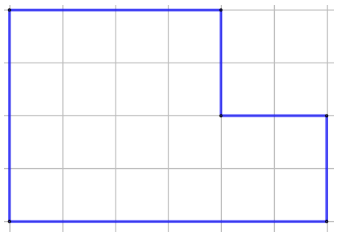
Recall we used the number of squares in a rectangle to find the product of two numbers whose length and breadth are the sides.

We can thus multiply the length and breadth of a rectangle to find the area A of a rectangle.

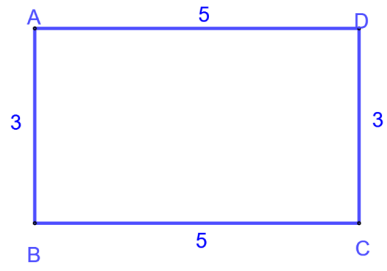
A = $l \times b$, where l is the length of the rectangle and b is its breadth.

The area is given in square centimeters if length and breadth are measured in centimetres and square metres if length and breadth are in metres.

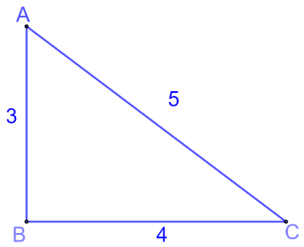
Exercise 3.2

1. Anurag ran around a rectangular field whose length is 150 metres and breadth is 100 metres. How much distance did he run if he ran
   (a) 1 round? (b) 4 rounds?
2. The side of a square baby sheet is 1.25 metres. You want to fix a lace around it, how much lace should you buy?
3. A farmer wants to fence his rectangular field whose sides are 400 and 300 metres. How much fence does he need?
4. Take the length of a small square as a unit of length and find the perimeter of the following figures:
   (a)
   
   (b)
   
   (c)
   
   (d)
   
   (e)
   

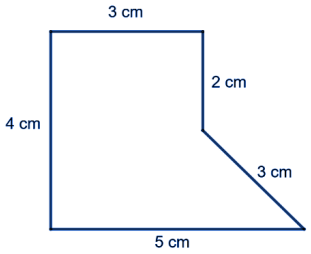
5. Find the perimeter of the following figures:



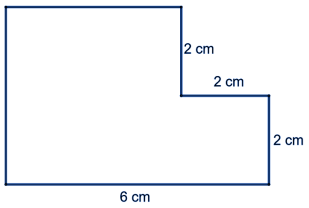
(a)



(b)



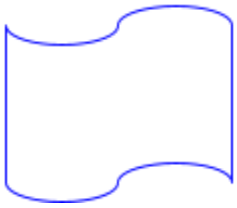
(c)



(d)

6. Find the perimeter of the following figures using wool.

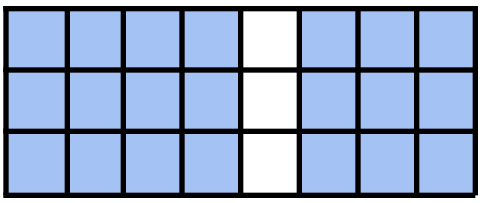
(a)



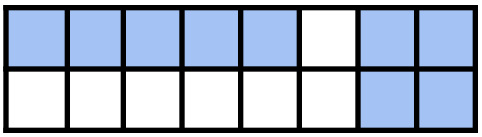
(b)

(c)

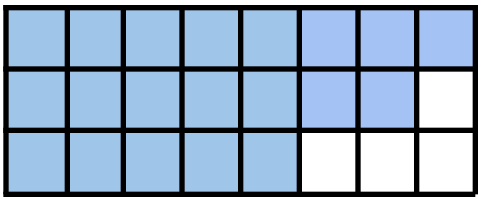
7. Give situations in daily life where we need to find the area.
8. Find the area of the figures given below, where a small square is the unit of area.



(a) (b)



(c)



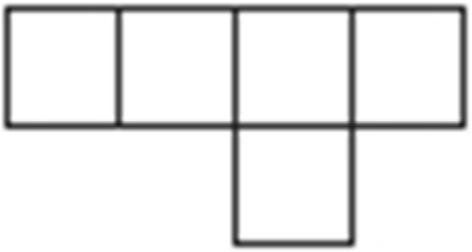
(d)

(e)

9. Find the area of the floor of a room whose lengths and widths are 4m and 3m respectively.

Nets

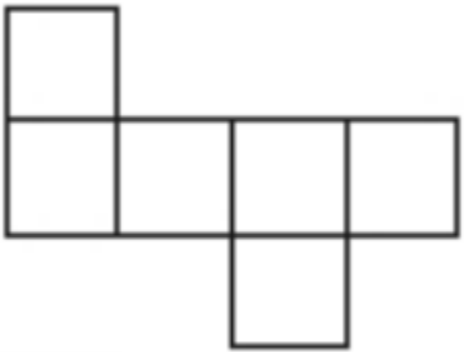
Show the video: https://youtu.be/jVlFsmpZe6o?t=36
A two-dimensional figure that can be cut out and folded in a three-dimensional box is called its net.
A cubical box without a lid when opened gives a net of a 5-face cube.
Trace and fold the net given in Activity sheet 3.4 to make an open box.
How many edges, faces, and vertices(corners) does it have?
Name the shape of its faces,
We can also draw its net on graph paper. For example, the net given below can be folded into a 5-face cube. Trace it and fold it into an open box.



Work in groups to make some more nets for a 5-face cube, cut and fold them to check whether they will fold into a cube or not.

Six-face cube

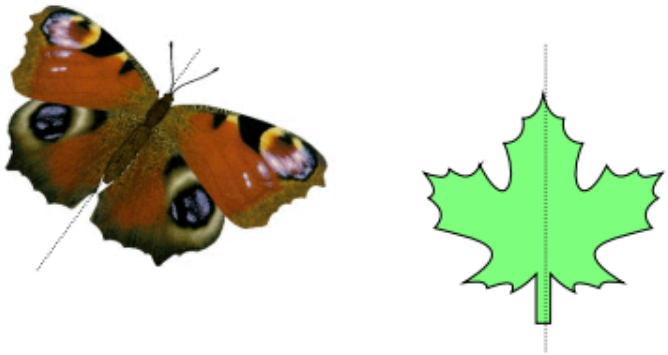
Show a cube and ask how many edges, faces, and vertices does it have?
Trace and fold the net given in Activity sheet 3.3 to make a closed box.
How many edges, faces, and vertices does it have? Name the shape of its faces.
We can draw nets of a cube on graph paper that will fold into a cube.
For example, the figures given below can be folded into a six-face cube.



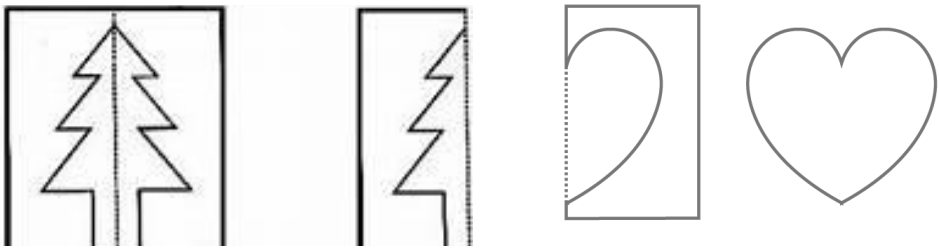
Work in groups to make some more nets for a 6-face cube, cut and fold them to check whether they will fold into a cube or not. How many different nets can you make?

Symmetry

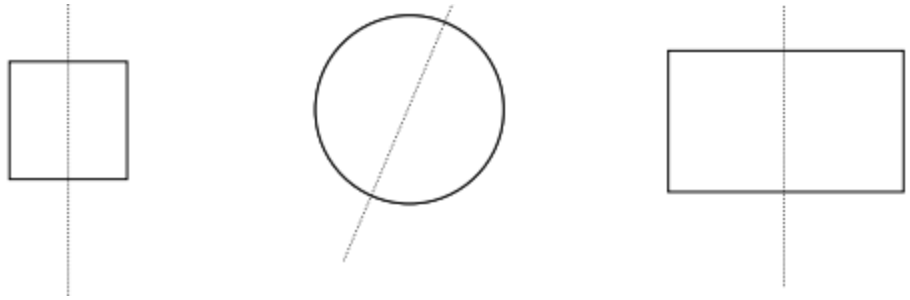
Show the video: https://youtu.be/MtqtIiJsfiE?t=21
If a picture can be folded along a line so that the two parts cover each other completely, then the picture is said to be symmetrical and the line is called the line of symmetry. We find many examples of symmetrical objects around us:



We can make symmetrical drawings with a crease as a line of symmetry by folding a paper and drawing a figure along the fold and cutting it, when you unfold it you will get a symmetrical object with the fold as the line of symmetry.



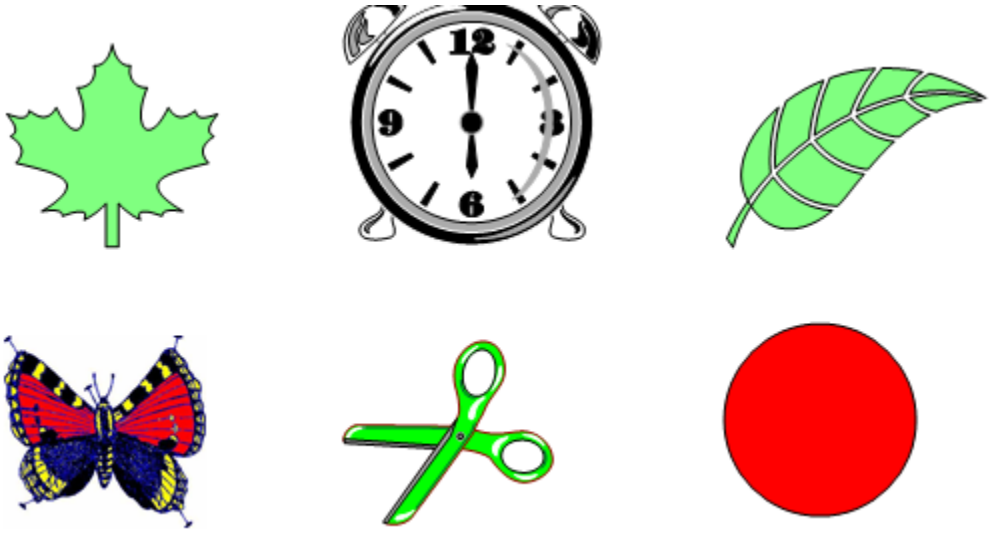
We can also find if geometrical figures have lines of symmetry by checking if we can fold them so that the two halves cover each other completely.
The dashed lines in the figures given below are lines of symmetry.



The dashed lines below are not lines of symmetry. They do cut the figures in half, but they don't create mirror-image halves.

Exercise 3.3

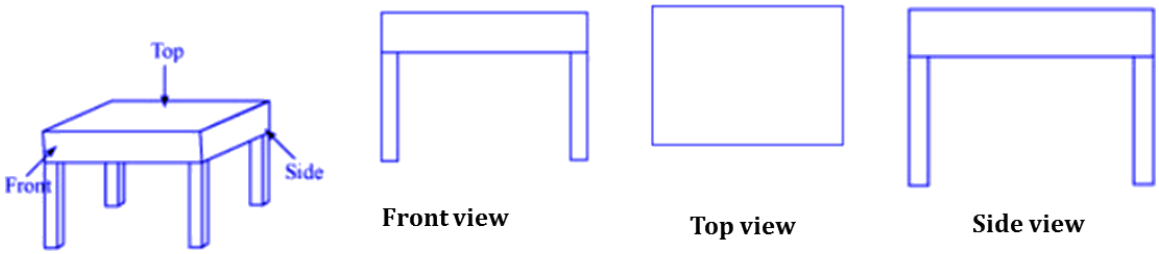
1. Which of the following figures are symmetrical? Mark a tick under it.



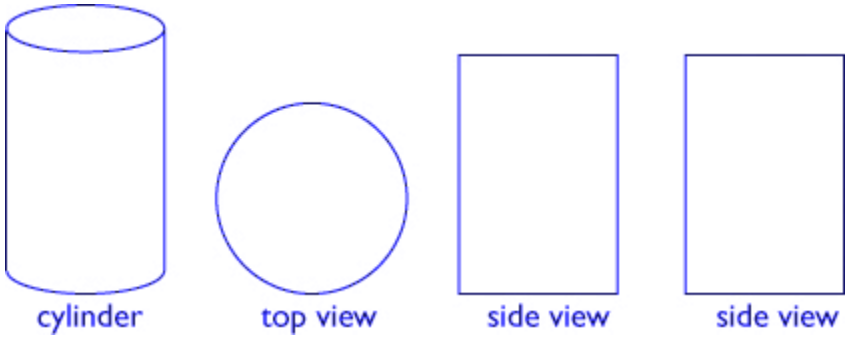
2. Find some pictures of objects that are symmetrical, paste them in your notebook, and draw lines of symmetry in those.
3. Make some symmetrical shapes by folding a piece of paper into two halves, drawing shapes, and cutting them out. Paste these in your notebook.
4. Draw and cut the figures given below on a graph or dot paper given in activity sheets 3 and 4, and find all lines of symmetry by folding these.
   (a) a square
   (b) a rectangle
   (c) a triangle

Top, Front, and side view of objects

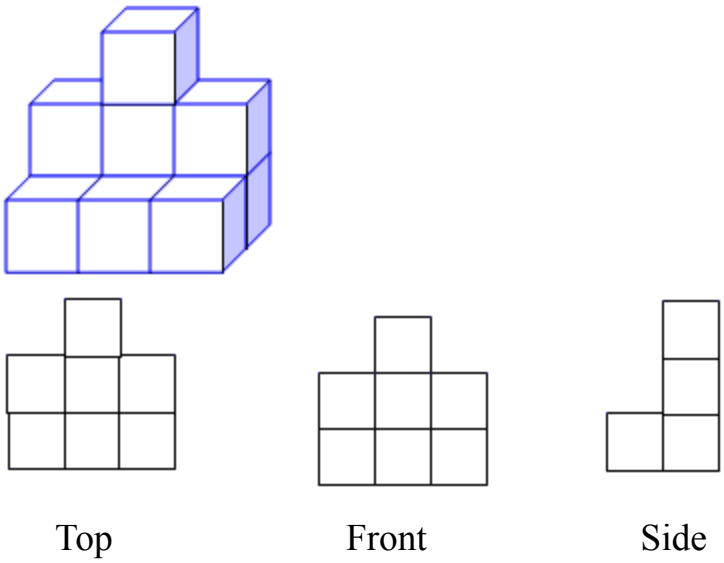
Show the video: https://youtu.be/xPj2qBLnbi4?t=9
Objects look different when seen from different positions.
For example, the top, front, and side views of a table are



Similarly the top, front, and side views of a cylinder are

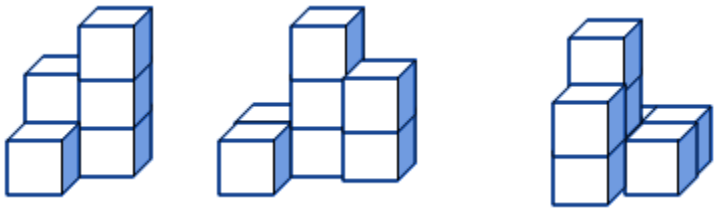


The front and side views of a cylinder are the same.
The top, front and side views of the structure made with blocks given below are



Exercise 3.4

1. Draw the top, front and side view of structures made with blocks whose pictures are given below:



(a) (b) (c)

2. Make some structures with cubes. (If these are not available teacher may make them or show figures)
3. Copy the structures made by others.
4. Draw the top, front and side view of those structures.
5. Draw the top, front and side view of a cuboid.
6. Draw the top, front and side view of a cone.

UNIT 4

Multiplication

Multiplication facts

The product of two one-digit numbers is called a **multiplication fact**. You had learned these in class 3. You should be able to recall these without thinking, as it would be helpful for multiplying all numbers however large. Look at the mastery test on multiplication in Appendix 2, write the ones you can recall immediately, and put an X against others. Find those by using the multiplication table in Appendix 3 and learn them.

Use of a multiplication table

Show the video: https://youtu.be/D6ajLh0isG8?t=30

A multiplication table given on the next page summarises all the multiplication facts in one table and is handy for finding multiplication facts that you cannot recall immediately.

Multiplication Table

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

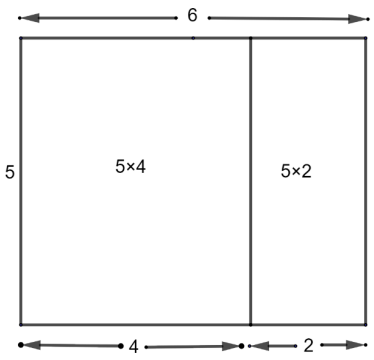
The cells coloured yellow give the labels for rows and columns.

Each cell gives the product of the number at the beginning of the row with the number at the top of the column.

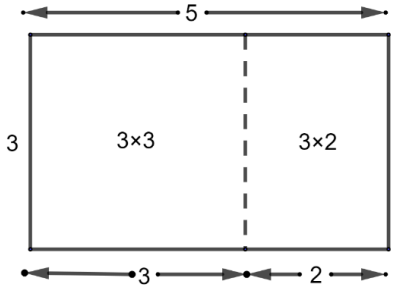
The row labeled 0 gives the product of different numbers and 0. Note that the product of any number and 0 is zero.
The row labeled 1 gives the product of 1 and different numbers. Note that product of any number and 1 is that number.
The row labeled 2 gives the product of 2 with different numbers.
The row labeled 3 gives the product of 3 with different numbers.
We can find a specific multiplication fact by highlighting a row number of one of the numbers and a column with the other number in the column with a label of the other number. The number in the cell in which the highlighted row and column meet gives the product of the two numbers.
For example, to find 8×4, we highlight the row with the label 8 and a column with the label 4. The number in the cell in which the highlighted row and column meet gives the product. As it has 32 in it, $8 \times 4 = 32$.

Properties of the multiplication

1. **The order of numbers in multiplication as in addition does not matter.** Verify from Multiplication Table:
   $3 \times 4 = 4 \times 3 = 12$, $6 \times 8 = 8 \times 6 = 48$, $8 \times 9 = 9 \times 8 = 72$.
2. **We can multiply three numbers by first multiplying any two of them and then multiplying their product with the third number.**
   Verify
   $3 \times 5 \times 2 = 15 \times 2$
   $3 \times 5 \times 2 = 3 \times 10$
   $3 \times 5 \times 2 = 6 \times 5 = 30$
3. **The product of a number and sum of two numbers is the same as the sum of the products of the number with the individual numbers.**
   For example, $5 \times 6 = 5 \times (4 + 2) = 5 \times 4 + 5 \times 2$.



Similarly, the product of a number and difference of two numbers is the same as the difference of the products of the number with the individual numbers.



$3\times(5 - 2) = 3 \times 5 - 3 \times 2 = 15 - 6 = 9.$

Verify

$5 \times 14 = 5 \times (10 + 4) = 5 \times 10 + 5 \times 4 = 50 + 20 = 70.$

$4\times(5 - 2) = 4\times5 - 4\times2 = 20 - 8 = 12.$

4. **We can multiply 3 numbers by first multiplying any 2 and then their product with the remaining number**

Verify

$2 \times 6 \times 5 = (2 \times 6) \times 5 = (2 \times 5) \times 6 = 10 \times 6 = 60$

$4 \times 8 \times 2 = (4 \times 8) \times 2 = (4 \times 2) \times 8 = 8 \times 8 = 64$

Rearranging the numbers sometimes makes it easier to calculate these products and you can do it mentally.

Multiplying a number by ten

The product of a number by ten is as many tens as the number.

For example,

$7 \times 10 = 7$ tens $= 70$

$4 \times 10 = 4$ tens $= 40$

$23 \times 10 = 23$ tens $=230$

Multiplying a number by a multiple of tens

1. We write the multiple of 10 as a product of a one-digit number and ten
2. Find the product of a one-digit number and the number
3. Multiply the product by 10.

Examples

$4 \times 20 = 4 \times 2 \times 10 = 8 \times 10 = 80$

$2 \times 30 = 2 \times 3 \times 10 = 6 \times 10 = 60$

$7 \times 50 = 7 \times 5 \times 10 = 35 \times 10 = 350$

Multiplying a number by 100

The product of any number and hundred is as many hundreds as the number.

For example,

$5 \times 100 = 5$ hundreds $= 500$

$36 \times 100 = 36$ hundreds $= 3600$

$483 \times 100 = 483$ hundreds $= 48300$

Multiplying a number by a multiple of hundreds

1. We write the multiple of 100 as a product of a one-digit number and one hundred.
2. Find the product of the one-digit number and the number
3. Multiply the product by 100.

Examples

$300 \times 4 = 100 \times 3 \times 4 = 100 \times 12 = 1{,}200$

Multiplication of a number by one-digit numbers

Use of expanded form

We can multiply a number by a one-digit number by

1. Writing the number in expanded form
2. Multiply hundreds, tens, and ones with the one-digit number.
3. Add all the products

Example 1

$23 = 20 + 3$

$\times 3$

$= 60 + 9 = 69$

Example 2

433 = 400 + 30 + 3

× 2

= 400 + 60 + 6 = 466.

Exercise 4.1

1. Fill in the blanks
   (a) $6 \times 0 =$ ___
   (b) $7 \times 0 =$ ___
   (c) $10 \times 0 =$ ___
   (d) $34 \times 0 =$ ___
   (e) $472 \times 0 =$___
2. Multiply the following mentally by using properties of multiplication.
   (a) $3 \times 2 \times 4$ (b) $2 \times 7 \times 4$ c) $8 \times 2 \times 5$
   (d) $2 \times 4 \times 5$ (e) $3 \times 9 \times 2$ (f) $6 \times 5 \times 7$
   (g) 5×12 (h) 2×18 (i) 4×13
   (j) 7×16 (k) 5×15 (l) 4×19
3. Fill in the blanks
   (a) $7 \times 4 = 4 \times$ ___
   (b) $5 \times$ ___ $= 6 \times 5$
   (c) $6 \times 8 \times 2 = 48 \times$___
   (d) $4 \times 7 \times 3 = 4 \times$ ___
   (e) $2 \times 6 \times 5 = 10 \times$ ___
   (f) $8 \times (5 + 4) = 8 \times 5 + 8 \times$ ___
   (g) $9 \times 8 = 9 (2 +$___)
   (h) $6 \times (2 + 5) = 6 \times$ ___
4. Find the following products
   (a) 3×10 (b) 27×10 (c) 180×10
   (d) 124×10 (e) 378×10 (f) 5482×10
5. Find the following products
   (a) 3×30 (b) 5×50 (c) 6×80
   (d) 4×120 (e) 7×90 (f) 4×70
6. Find the following products
   (a) 4×100 (d) 3×400 (c) 7×700
7. Multiply the following
   (a) 43×2 (b) 11×6 (c) 32×3
   (d) 62×5 (e) 23×8 (f) 92×7
   (g) 56×4 (h) 74×9 (i) 243×2
   (j) 132×3 (k) 451×6 (l) 673×8

(m) 539×4 (n) 972×7 (o) 825×5

(p) 659×9 (q) 368×6 (r) 148×8

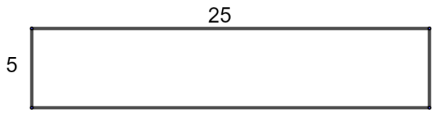
Partition model

We will explain it by an example

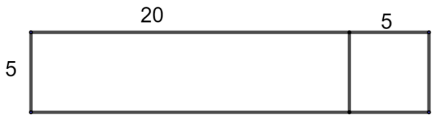
Example 1

Find 25 × 5

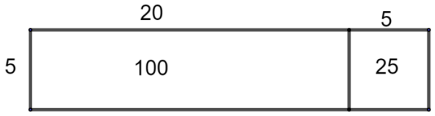
1. Draw a rectangle and label the sides with 25 and 5.
   These do not have to be exact or to the scale.



2. Partition the two-digit number into numbers that are easier to calculate. Split it into two numbers, one of which is the highest multiple of 10 with the multiplier less than the number e.g. split 25 into 20 and 5.
   Draw a line in the rectangle to show the partition.



3. Multiply the number at the top of each column by the number on the side of the rectangle and write the product in the box.



4. Add the numbers in both boxes. This gives the product of two numbers.
   100 + 25 = 125
5. Therefore 25 × 5 = 125

Short algorithm for multiplication of multi-digit numbers by a one-digit number

Show the video: https://youtu.be/FJ5qLWP3Fqo?t=337

We can write the multiplication of a two-digit number by a one-digit number say 56 × 6 in short form as follows:

1. Write the multiplication in column form and draw a line below the numbers.

2. Multiply the ones by 6, 6 × 6 = 36. Rename it as 3 tens + 6 ones. Write the 6 in ones place below the line and tens in tens place above the numbers for addition to tens after the multiplication of tens.
3. Multiply the tens by 6, 5 tens × 6 = 30 tens, and add 3 tens to it which gives 33 tens. Rename 33 tens as 3 hundreds and 3 tens and Write the tens and hundreds below the line in the tens place and hundreds place.

```
  3
 56
×  6
-------
336
-------
```

Multiplication of a three-digit number by a one-digit number say 258 × 4 in short form as follows:

1. Write the multiplication in column form and draw a line below the numbers.
2. Multiply the ones by 4, 8 × 4 = 32, write the 2 in ones column below the line and 3 tens in tens column above the numbers for addition to tens after the multiplication of tens by the number.
3. Multiply the tens by 4, 5 tens × 4 = 20 tens, and add 3 tens to 20 tens, which gives 23 tens. Rename 23 tens as 2 hundreds + 3 tens. Write the 3 in tens column below the line in the tens place and 2 hundreds in hundreds column above the numbers for addition to hundreds after the multiplication of hundreds by the number.
4. Multiply the hundreds by 4, 2 hundreds × 4 = 8 hundreds, and add 2 hundreds to it which gives 10 hundreds. Rename 10 hundreds as 1 thousand. Write 0 in hundreds place (as there are 0 hundreds) and 1 in thousands place below the line.

Example 1

```
  2 3
  258
×   4
-------
 1032
-------
```

Multiplication of a two-digit number by a two-digit number

We can also multiply a two-digit number by a two-digit number by using a partition model.

Partition model

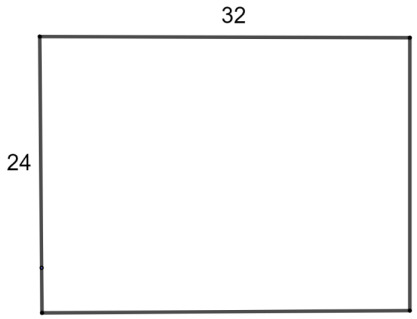
We will explain it by an example

Example 1

Find 32 × 54

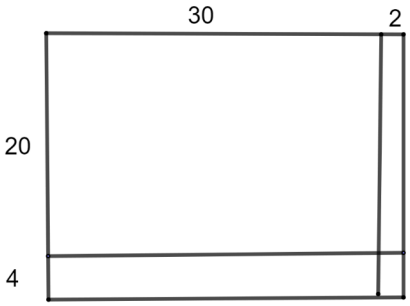
Draw a rectangle and label the sides with 32 and 54.

These do not have to be exact or to the scale.

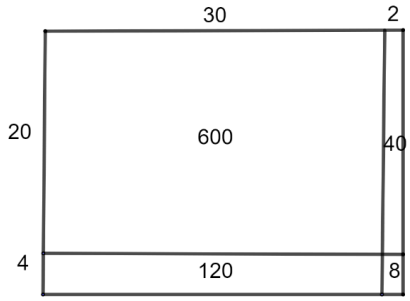


Partition the two-digit number into numbers that are easier to calculate. We split it into tens and ones. Let us split 32 into 30 and 2 and 24 into 20 and 4

Draw lines in the rectangle to show the partition.



Multiply the numbers at the top of each column by each of the numbers on the side of the rectangle and write the product in the boxes.



Add numbers in all the boxes. It gives the product.

$32 \times 24 = 600 + 40 + 120 + 8$

$= 768$

Short algorithm

Show the video: https://youtu.be/RVYwunbpMHA

We can multiply a two-digit number by a two-digit number by following the steps given below.

1. Write one of the numbers below the other aligning the ones with ones and tens with tens and draw a line below them.
2. Multiply by ones and write it below the line.
3. Multiply by tens and write it below the line for multiplication by ones beginning with tens place as we are multiplying by tens, write 0 in ones place.
4. Add the two.

Example 1

```
  1
   3
   45
 × 36
------
 270          45 × 6
1350          45 × 30
-------
1620          270 + 1350
-------
```

Example 2

```
  1
   5
   58
  ×27
-------
 406          58 × 7
1160      _____58 × 20
-------
1566          406 + 1160
-------
```

Multiplication of a three-digit number with a two-digit number

Partition Model

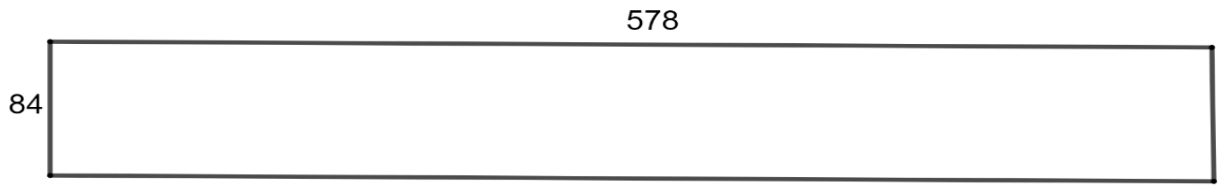
We will explain it by an example

Example 1

Find 578 × 84

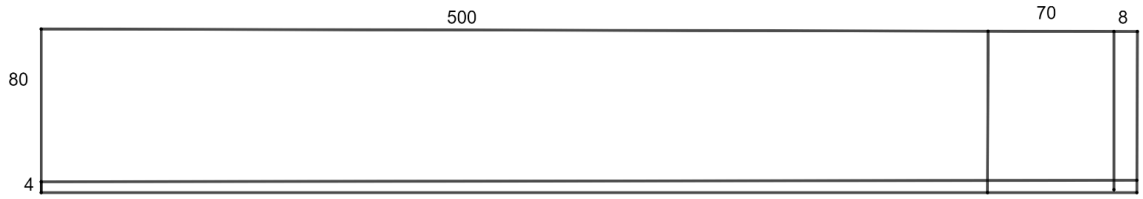
Draw a rectangle and label the sides with 578 and 84.

These do not have to be exact or to the scale.

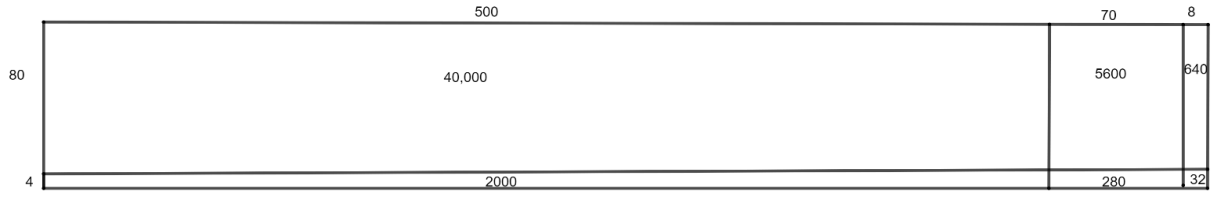


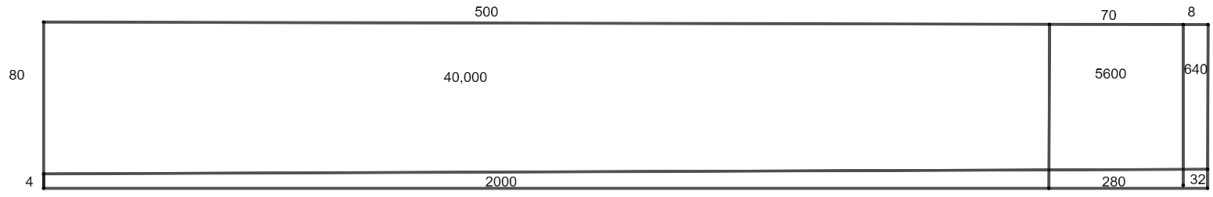
Partition the two-digit number into numbers that are easier to calculate. We split it into tens and ones. Let us split 578 into 500, 70, and 8 and 84 into 80 and 4

Draw lines in the rectangle to show the partition.



Multiply the numbers at the top of each column by each of the numbers on the side of the rectangle and write the product in the boxes.





Add the numbers in all the boxes. This gives the product of two numbers.

$578 \times 84 = 32 + 280 + 2{,}000 + 640 + 5{,}600 + 40{,}000 = 48{,}552$

Short Algorithm

Multiplication of a three-digit number by a two-digit number can be done by following the steps given below:

1. Multiply the number by ones
2. Multiply the number by tens
3. Add the two

Example 3

```
   31
    4 2
   263
 ×  57
 ---------
  1841          263 × 7
13150           263 ×50
---------
14991           1841 +13150
---------
```

Example 4

```
   6 6
    33
   578
   ×84
---------
  2312          578 × 4
 46240          578 × 80
----------
 48552          2312 + 46240
----------
```

Estimation of products

As the numbers get large, it becomes tedious to multiply by paper and pencil and we can use a calculator. However, one can make mistakes with the calculator also. We can find an estimate by rounding off the two-digit numbers to the nearest ten, three-digit numbers to the nearest hundred, and multiplying these mentally. This would help us to find out whether the product given by the calculator is reasonable or not.

Example 5

Find an estimate of the product of 47 × 32

Rounding off 47 and 32 to nearest 10, we get 50 and 30 and multiplying them the estimate of the product is 1,500. Whereas 47 × 32 = 1,504 close to it.

Example 6

Find an estimate of the product of 210 × 58

Rounding off 210 to nearest 100 and 58 to nearest 10, we get 200 and 60 and multiplying them the estimate of the product is 12,000. Whereas 210 × 58 = 12,180 close to it.

Exercise 4.2

1. Multiply
   (a) 24 × 5 (b) 30 × 8 (c) 349 × 7
   (d) 604 × 6 (e) 780 × 9 (f) 463 × 4
2. Multiply
   (a) 16 × 12 (b) 56 × 23 (c) 60 × 45
   (d) 49 × 34 (e) 74 × 65 (f) 89 × 70
   (g) 75 × 58 (h) 23 × 67 (i) 88 × 82
   (j) 40 × 63 (k) 46 × 80 (l) 93 × 64
3. Multiply
   (a) 283 × 14 (b) 539 × 26 (c) 974 × 38
   (d) 736 × 57 (e) 853 × 49 (f) 389 × 72
   (g) 847 × 86 (h) 178 × 95 (i) 470 × 66
   (j) 893 × 73 (k) 906 × 82 (l) 500 × 75
4. Multiply the following mentally:
   (a) 30 × 40 (b) 50 × 80 c) 60 × 90
   (d) 200 × 30 (e) 400 × 60 (f) 700 × 70
   (g) 500 × 200 (h) 500 × 100 (i) 400 × 200
5. Multiply the following and estimate the following products to check if your answer seems reasonable.
   (a) 48 × 63 (b) 52 × 84 c) 37 × 23
   (d) 168 × 23 (e) 842 × 48 (f) 670 × 32

Multiplication of three numbers

There are some situations where we need to multiply three numbers. For example, a box can hold 20 pencil boxes each of which contains 12 pencils, and we want to know how many pencils will 5 cartons contain?
Here we first find how many pencils would one carton contain and then how many pencils would six cartons contain.
1 carton will contain 20 × 12 pencils = 240 pencils.
5 cartons will contain 240 × 5 = 1200 pencils.

Exercise 4.3

1. A notebook costs 6 rupees. How much money do you need for buying 8 notebooks?
2. There are 35 oranges in a basket. How many oranges would be there in 6 baskets?
3. A packet of candles contains 24 candles. Raj bought 5 packets, how many candles did he buy?
4. If Meena has 45 fifty-rupee notes, how much money does she have?
5. A dining chair costs Rs. 750 and a dining table Rs 1250. If Sunita bought 6 dining chairs and a dining table, how much money should she pay to the shopkeeper?
6. Rajan bought 12 roses each costing 5 rupees.
   (a) How much money should he pay to the shopkeeper?
   (b) If he paid a 100-rupee note to the shopkeeper, how much money the would the shopkeeper return to him?
7. A carton can hold 24 boxes of candles each of which contains 10 candles. Ronit bought 3 cartons of candles for Diwali. How many candles did he buy?
8. A week has seven days. How many days would be there in 52 weeks?
9. 1 centimetre = 10 millimetres, how many millimetres would be there in 3 centimetres?
10. Give situations in daily life that require multiplication.
11. Give situations in daily life that require the multiplication of three numbers.

UNIT 5

Multiples and Factors

Multiples

The product of a number by any number is called multiple of the number.
As $5 \times 1 = 5$, $5 \times 2 = 10$, $5 \times 3 = 15$, $5 \times 4 = 20$, ……
5, 10, 15, 20… are multiples of 5.
Similarly $2 \times 1 = 2$, $2 \times 2 = 4$, $2 \times 3 = 6$, $2 \times 4 = 8$, $2 \times 5 = 10$, …
2, 4, 6, 8, 10…are multiples of 2.
A number can have any number of multiples.
We can find multiples of a number say 7 by either of the following methods.

1. Encircling every 7^{th} number in the hundred table beginning with 7 in Appendix 1. All the encircled numbers are multiples of 7.
2. Multiplying 7 in turn by 1, 2, 3, 4, 5, 6 … all the products are multiples of the number.

Odd and even numbers

All multiples of 2 are called **even numbers**
A number that is not a multiple of 2 is called an **odd number**.
We can find all even numbers by encircling every alternate number beginning with 2 in a hundred table. What do you notice about the digit in the ones place in these? (The digit in ones place is 0, 2, 4, 6, or 8.)
The numbers that are not encircled are odd. What do you notice about the digit in the ones place in these? (The digit in ones place is 1, 3, 5, 7, or 9.)
All counting numbers are either even or odd.

Multiples of 5 and 10

We can find all multiples of 5 by encircling every fifth number beginning with 5 in a hundred table. What do you notice about the digit in the ones place in these? (The digit in ones place is 0 or 5.)
We know from the table of 10, all multiples of 10 will have 0 in ones place.

Factors

If a number divides another number evenly, that is the remainder is zero the number is said to be a factor of the other number. We will restrict to two-digit numbers only.

$42 \div 7 = 6$, therefore 7 is a factor of 42.

We also know that if $42 \div 7 = 6$, $42 \div 6 = 7$, therefore the quotient is also a factor of that number.

To check if a number say 4 is a factor of another number, say 17, we may

1. Set aside 17 objects, and go on making sets of 4 objects. If some objects less than 4 are left, then 4 is not a factor of 17. In this case, we can make 4 groups of 4 objects and 1 object is left over. Thus 4 is not a factor of 17.
2. Encircle every fourth number, and stop when the encircled number is equal to or before it exceeds the number 17. In this case, we will encircle only 4, 8, 12, and 16 as the next number to be encircled $20 > 17$. Four is a factor of 17 only if 17 is one of the encircled numbers. As 17 is not one of the encircled numbers 4 is not a factor of 17.
3. Divide 17 by 4, using long division, and check if the remainder is 0.

$$\begin{array}{r} 4 \\ 4\overline{)17} \\ \underline{16} \\ 1 \end{array}$$

   As the remainder is not 0, therefore 17 is not divisible by 4.
4. As any number is divisible by 1, the number 1 **is a factor of any number**.
5. As any number is divisible by the number itself, **the number itself is a factor of any number.**

A number except 1 has 2 or more factors.

If a number is a factor of a number, all its factors are also factors of the number.

Verify 6 is a factor of 24. All factors of 6-1, 2, 3, and 6 are also factors of 24.

When we multiply two or more than two numbers, each number is a factor of the product.

For example, $7 \times 8 = 56$, 7 and 8 are factors of 56.

Similarly, as $3 \times 4 \times 5 = 60$, 3, 4, 5 are factors of 60.

Counterexample

In mathematics, even a single example that does not hold proves a generalization(holds for all numbers e.g. any number + 0 = 0) wrong. For example, to disprove the generalization that if a number is a factor of a number all its multiples are also factors of a number. We only need to show only one example in which it does not hold e.g. 2 is a factor of 10, but its multiple 4 is not a factor of 10.

The example that disproves it is called a **counterexample**.

Finding all factors of a number

While you can find all factors of a number by dividing the number by 1, 2, 3, 4, and so on and checking whether it is divisible or not. You can use some generalizations to shorten your work. These are

1. One is a factor of any number and is the smallest factor.
2. The number itself is a factor of any number and is the greatest factor of that number.
3. 2 is a factor of a number, only if the number is even.
4. 5 is a factor of a number, only if the number ends in 0 or 5.
5. 10 is a factor of a number, only if the number ends in 0.
6. If any divisor is a factor of the number, then the quotient is also the factor. That is, if 7 is a factor of 63, the quotient 9 obtained by dividing 63 by 7 is also a factor.
7. You stop when the divisor and quotient are interchanged the first time.

Example 1

Find all factors of 20.

$$\begin{array}{r} 10 \\ 2\overline{)20} \\ 2 \\ \hline 0 \end{array}$$

2 and 10 are factors of 20

$$\begin{array}{r} 6 \\ 3\overline{)20} \\ 18 \\ \hline 2 \end{array}$$

3 and 6 are not factors of 20

$$\begin{array}{r} 5 \\ 4\overline{)20} \\ 20 \\ \hline 0 \end{array}$$

4 and 5 are factors of 20

$$\begin{array}{r} 4 \\ 5\overline{)20} \\ 20 \\ \hline 0 \end{array}$$

We stop here, as the divisor and quotient are interchanged

All factors of 20 are 1, 2, 4, 5, 10, and 20.

Example 2

Find all factors of 21

As 21 is an odd number, it is not divisible by even numbers, so we will not check any even number.

Also as the last digit is not 0 or 5, 21 is not divisible by 5. Therefore 5 is not a factor of 21.

$$\begin{array}{r} 7 \\ 3\overline{)21} \\ 21 \\ \hline 0 \end{array}$$

Therefore 3 and 7 are factors of 21

$$\begin{array}{r} 3 \\ 7\overline{)21} \\ 21 \\ \hline 0 \end{array}$$

Stop here.Can you tell why?

Therefore all factors of 21 are 1, 3, 7, 21**.**

Example 3

Find all factors of 60.

As 60 ends in 0, it is divisible by 5, 10.

As 60 ÷ 5 = 12, 12 is a factor of 60.

As 60 ÷ 10 = 6, 6 is a factor of 60.

As 60 ends in 0, it is an even number and therefore divisible by 2.

As 60 ÷ 2 = 30, 30 is a factor of 60.

As 6 is a factor of 60, therefore 3 a factor of 6 is also a factor of 60

so we will check only 4, 7, 8, 9, till the product of divisor and quotient is repeated ……..

$$\begin{array}{r} 15 \\ 4\overline{)60} \\ 4 \\ \hline 20 \\ 20 \\ \hline 0 \end{array}$$

Therefore 4 and 15
Are factors of 60

$$\begin{array}{r} 8 \\ 7\overline{)60} \\ 56 \\ \hline 4 \end{array}$$

Therefore 7 and 8 are not factors of 60

$$\begin{array}{r} 7 \\ 8\overline{)60} \\ 56 \\ \hline 4 \end{array}$$

Stop here.

Therefore, all factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60.

Exercise 5

1. Write the first 5 multiples of 3
2. Write the first ten multiples of 10.
3. Write the first 7 multiples of 100.
4. Write the first 4 multiples of 1000
5. Encircle every alternate number beginning with 2 and answer the following:
   (a) What are the encircled numbers called?
   (b) What are the digits in ones place in these?
   (c) Would it hold for numbers beyond 99?
   (d) What are the numbers that are not encircled called?
   (e) What are the digits in ones place in these?
   (f) Would it hold for numbers beyond 99?
   (g) Is 2 a factor of all the encircled numbers?
   (h) Are all the encircled numbers multiples of 2?
6. Which of the following numbers are even?
   3, 6, 17, 20, 45, 64, 69
7. Which of the following numbers are odd?
   1, 63, 58, 57, 34, 91, 40
8. Would the sum of 2 even numbers be always even? If not, give a counterexample.
9. Would the sum of 2 odd numbers be always even? If not, give a counterexample.
10. Would the sum of an odd number and any even number be even? If not, give a counterexample.
11. Which of the following numbers are multiples of 10?
    30, 45, 60, 74
12. (a) Is 4 a factor of 13?
    (b) Is 7 a factor of 56?
    (c) Is 8 a factor of 56?
13. Find all sets of 3 different factors which when multiplied give the product 24.
14. Encircle every 5^{th} number in the hundred table, and fill in the blanks in the following:

(a) These end in the digits _____

(b) All the encircled numbers are _____of 5.

(c) 5 is a _____ of all the encircled numbers.

15. Which of the following numbers are multiples of 5?
    43, 70, 54, 25
16. Encircle every 4^{th} number and every 6^{th} number in the hundred table. Were any of the numbers encircled twice? What does it mean?
17. Find all factors of
    (a) 12 (b) 10 (c) 24 (d) 17
18. Can 4 be a factor of an odd number?
19. If 3 is a factor of a number would its multiple 6 necessarily be a factor of that number? If not, give a counterexample.
20. If 8 is a factor of a number would 4 necessarily be a factor of that number? If not, give a counterexample.
21. Which of the numbers 23, 40, 25, 12, 5, 2, 30 have
    (a) 2 as a factor and why?
    (b) 5 as a factor and why?
    (c) 10 as a factor and why?
22. Which of the numbers 23, 40, 25, 12, 5, 2, 30 will not have
    (a) 2 as a factor and why?
    (b) 5 as a factor and why?
    (c) 8 as a factor and why?
    (d) 10 as a factor and why

UNIT 6

Division

There are many situations in which we want to make equal groups of a given size from a number of objects and want to know how many groups there would be.
For example, there are 8 toffees and we wanted to give 2 toffees to each child and we want to know how many children can have it. In this case, we go on giving 2 toffees to each child till no toffees are left. How many children will get it? 4.
We express it by a division equation-8 ÷ 2 = 4, where ÷ is a symbol for division.
We read it as eight divided by 2 is equal to four.
There are other situations in which we need to share a number of objects equally among a given number of persons and we want to find the share of each person. For example, there are 6 toffees and we wanted to distribute it equally between three children. We first give 1 toffee to each child, then give 1 more toffee to each child until all toffees have been distributed. How many toffees did each child get? 2.
We express it by a division equation-6 ÷ 3 = 2.
We read it as 6 divided by 3 is equal to 2.
The number that is divided is called the **dividend,** the number by which it is divided is called the **divisor**, the number that results is called **quotient** and ÷ is the sign of division. For example, in 12 ÷ 4 = 3, 12 is the dividend, 4 is the divisor and 3 is the quotient.

Division facts

Show the video: https://youtu.be/tER-YslAY-8?t=243
The division is the inverse of multiplication. In multiplication we are given the number of groups and group size and multiplication gives the total number of objects. Whereas in a division problem we are given the total number of objects, the group size or the number of groups and we have to find the number of groups or group size.
The division facts that correspond to multiplication facts (multiplication of two one-digit numbers) are called division facts.

Division facts are very important for further learning and you should memorize them.

Multiplication and division families

We have multiplication and division families like addition and subtraction families.

Recall a family involves the same three numbers.

Learning facts in a family together will help you memorize them faster.

Verify the following: $6 \times 9 = 9 \times 6 = 54$, $54 \div 6 = 9$, $54 \div 9 = 6$.

These show

The order of numbers in multiplication does not matter.

The dividend divided by the divisor gives the quotient.

The dividend divided by the quotient gives the divisor.

The product of quotient and divisor = dividend.

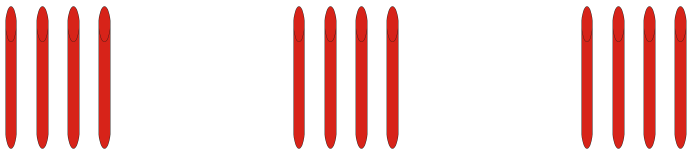
Finding division facts

We can find division facts by use of objects, repeated subtraction, use of graph paper, and the multiplication table.

Use of objects

Set aside as many objects as the total number of objects to be shared and make sets of the same size as the divisor and count the number of sets that give the quotient.

For example, to find $12 \div 4$, set aside 12 objects e.g. sticks, and make sets of 4 sticks and count the number of sets which is 3, therefore $12 \div 4 = 3$.



Repeated subtraction

To find $8 \div 2$, we go on subtracting 2 till we reach 0 and count how many times we subtracted.

```
  8
- 2                (1)
------
  6
- 2                (2)
------
  4
- 2                (3)
------
  2
- 2                (4)
-----
  0
-----
```

As we could subtract 2 four times, 8 ÷ 2 = 4

Use of graph paper

Mark a 9 × 9 square on graph paper. Shade as many squares in a row as the divisor. Go on shading squares till you have as many squares as the dividend. The number of rows gives the quotient.

For example, to find 30 ÷ 6, we start shading 6 squares in a row/column and go on shading the next rows/columns until we have shaded 30 squares. As we need 5 rows/columns to shade 30 squares(recall 6 ×5 = 30), therefore 30 ÷ 6 = 5.

Use of Multiplication table

We can find the division facts from the multiplication table as follows:

Highlight the numbers in the row corresponding to the divisor till you find the dividend and highlight the column above that cell. Read the column number, it gives the quotient. For example, to find 56 ÷ 8, highlight the 8th row till you find the cell with 56, then highlight the column above 56 and read the column number, which gives the quotient. As the column number is 7, therefore 56 ÷ 8 = 7.

Multiplication Table

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

Exercise 6.1

1. Write the division equation for the following:

(a)
```
  15
 - 5
------
  10
 - 5
------
   5
 - 5
------
   0
------
```

(b)
```
   6
 - 3
-----
   3
 - 3
------
   0
------
```

2. Find mentally

(a)	7×3	$21 \div 3$	$21 \div 7$
(b)	8×6	$48 \div 6$	$48 \div 8$
(c)	5×9	$45 \div 9$	$45 \div 5$
(d)	9×7	$63 \div 7$	$63 \div 9$
(e)	$6 \times 6 = 36$	$36 \div 6 =$	
(f)	$8 \times 7 = 56$	$56 \div 7 =$	$56 \div 8 =$
(g)	$9 \times 9 = 81$	$81 \div 9 =$	

3. Set aside 25 sticks and make sets of 5 sticks. How many sets of 5 sticks did you make? Write a division equation.
4. Set aside 12 sticks and make sets of 4 sticks. How many sets of 4 sticks did you make? Write a division equation.
5. If there are 10 laddoos and you want to give 2 laddoos to each person, how many people can you give it to? Write the division equation.
6. Use the multiplication table given earlier to divide the following:

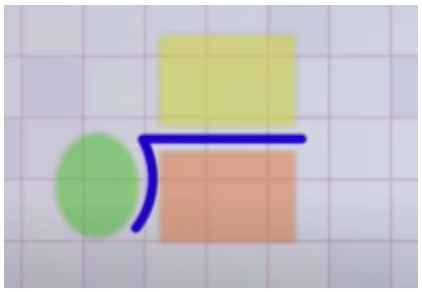
(a) $8 \div 2$	(b) $12 \div 4$	(c) $9 \div 3$	(d) $16 \div 4$
(e) $14 \div 2$	(f) $24 \div 6$	(g) $18 \div 3$	(h) $42 \div 7$
(i) $14 \div 7$	(j) $24 \div 8$	(k) $56 \div 7$	(l) $27 \div 9$
(m) $30 \div 6$	(m) $48 \div 6$	(n) $63 \div 9$	(o) $81 \div 9$

Long division

As a number has a limited number of factors, it will not divide exactly by numbers which are not its factors.
For example if you have 28 one-rupee notes/coins and want to distribute them equally among 5 persons
(a) How many could you give to each person? -5.
(b) How many rupee notes were used? 5×5 = 25.
(c) How many rupee notes were left? 28 - 25 = 3

Division with a remainder

For the division of such numbers instead of the division symbol, we use long division.



In the space coloured pink, we write the number that is to be divided and is called the **dividend**, in the space coloured green we write the number by which the number is to be divided called the **divisor**, and in the yellow space, we write the answer which is called the **quotient** and the number left over after the division is called the **remainder** and sometimes is written in the space for the quotient after writing R/r there.

The remainder must always be less than the divisor.

Example 1-Divide 28 by 5.

```
    5
5)28
   25
   --
    3
-----
```

To divide 28 by 5, we carry out the following steps:

1. Write 28 in the place for dividend and write 5 in the place for the divisor.
2. Find the highest multiple of 5 which is less than 28. As it is 5, write 5 in ones place in the place for the quotient.
3. Multiply the divisor by 5. As $5 \times 5 = 25$, we write 25 below 28.
4. Subtract 25 from 28.

We can verify the answer to a division problem by the relation:

Dividend = Divisor× Quotient + Remainder

In the above example $5 \times 5 + 3 = 28$, the same as the dividend. Therefore it is correct.

Example 2-Divide 50 by 4

$$
\begin{array}{r}
12 \\
4\overline{)50} \\
4 \\
\hline
10 \\
8 \\
\hline
2
\end{array}
$$

Verification of the answer $(12 \times 4) + 2 = 48 + 2 = 50$

$$
\begin{array}{r}
10 \\
5\overline{)52} \\
5 \\
\hline
02 \\
0 \\
\hline
2
\end{array}
$$

Verification of the answer $(10 \times 5) + 2 = 50 + 2 = 52$

Remember to divide the digits in all places even if it is less than the divisor or zero.

Division of two or more digit numbers by a one-digit number

Watch the video: https://youtu.be/LGqBQrUYua4

We can use the partition model for division.

Partition model

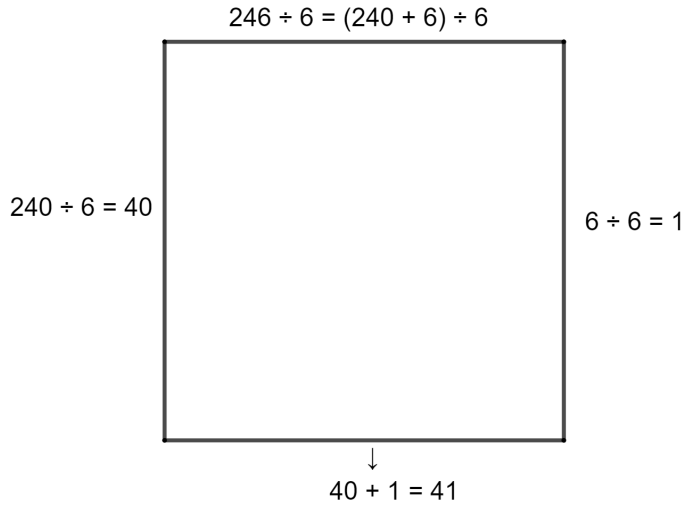
We will explain it by examples.

Example 3

Find 246 ÷ 6 by partitioning

We partition a number into the highest multiple of the divisor and the number of tens which is less than the dividend and its difference from the dividend.

For example, we will partition 246 into 240 + 6. As the multiple of 6 and the highest number of tens(4) which is less than the dividend is 24 tens or 240.



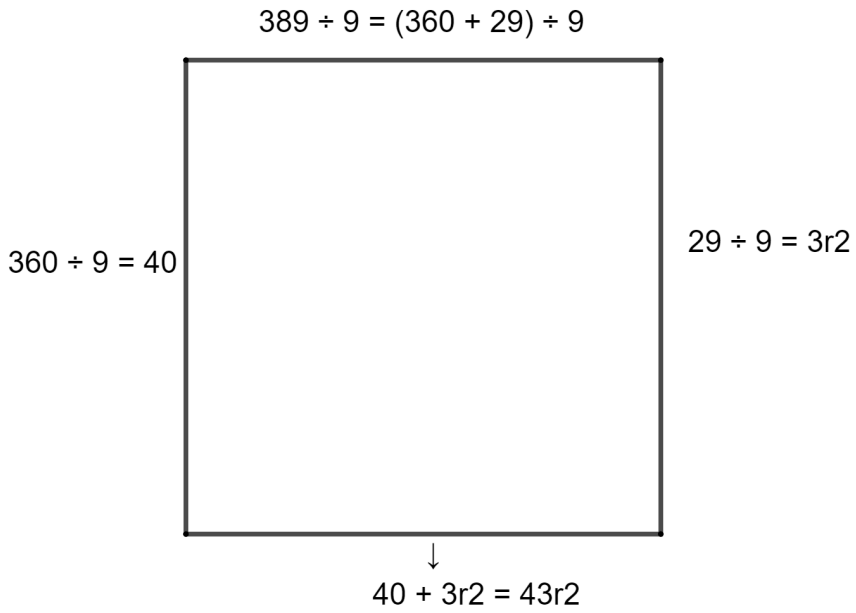
We will carry out the following steps for dividing 246 by 6.

1. Partition 246 into 240 and 6.
2. First, divide 240 by 6.
3. We know from multiplication by tens that 24 tens ÷ 6 = 4 tens = 40.
4. Then we divide 6 ÷ 6. That we know from division facts that it is equal to one.
5. Add the answer we got by dividing the parts separately: 40 + 1 =41. That gives the answer. Thus 246 ÷ 6 = 41.

Example 4

Find 389 by 9

Let us find 389 ÷ 9 by partitioning.



1. Partition 389 into 360 and 29.
2. First, divide 360 by 9.
3. We know from multiplication by tens that 36 tens = 9 × 4 tens.
4. As the division is the inverse of multiplication, 36 tens ÷ 9 = 4 tens = 40.
5. Then we divide 29 ÷ 9. That is equal to 3r2
6. Add the answer we got by dividing the parts separately:
   40 + 3r2 =43r2

Use of Money

We will explain it by an example

Example 5-Divide 853 by 6.

The teacher can explain the procedure using fake money or asking a series of questions given below:

Suppose you want to divide 853 rupees among 6 persons equally and you have 8 hundred-rupee notes, 5 ten-rupee notes, and 3 one-rupee notes.

1. How many hundred-rupee notes can you give to each?-1
2. You are left with how many hundred-rupee notes. (2)
3. How many ten-rupee notes can you get for those? (20)
4. How many ten-rupee notes do you have now? (20 + 5 = 25)
5. How many ten-rupee notes can you give to each? (4)
6. How many ten-rupee notes are left? (1)
7. How many one-rupee notes can you get for those? (10)
   How many one-rupee notes do you have now? (10+3=13)
8. How many one-rupee notes can you give to each? (2)
   How many one-rupee notes are left? (1).
9. How much money did each person get? (Rs.(1×100 + 4×10 + 2) = Rs. 142))
10. How much money was left? (Rs 1)

The teacher can then explain the procedure for division pointing out the analogy with money for each step.

1. Write 853 in the place for dividend and write 6 in the place for the divisor.
2. Look at the hundreds place and find a multiple of 6 which is less than 8. As it is 1, we write 1 in hundreds place in the place for quotient.
3. Multiply the divisor by 1. As 6×1 = 6, we write 6 below 8 and subtract 6 from 8 which gives 2.
4. Then we bring the next digit down that makes it 25 and find the highest multiple 6 that is less than 25. As this is 4, we write 4 in the tens place in the quotient.
5. Multiply the divisor by 4. As 6×4 = 24, we write 24 below 25 and subtract 24 from 25 which gives 1.

6. Bring the next digit down that makes it 13 and find the highest multiple of 6 that is less than 13. As this is 2, we write 2 in the one's place in the quotient.
7. Multiply the divisor by 2. As $6 \times 2 = 12$, we write 12 below 13 and subtract 12 from 13 which gives 1.
8. As all the digits have been brought down, it gives the remainder. The remainder = 1

We can verify it by checking if $142 \times 6 + 1 = 853$.

```
  142
6)853
   6
  --
  25
  24
  --
  13
  12
  --
   1
```

Verification of the answer

```
  142
×   6
-------
  852
+   1
--------
  853
--------
```

If the number of hundreds is less than the divisor, remember to start writing the quotient in the tens place. And if the number of tens and/or ones is less than the divisor, remember to write 0 in the tens place and/or ones place.

Example 6-Divide 560 by 4

$$
\begin{array}{r}
140 \\
4\overline{)560} \\
\underline{4} \\
16 \\
\underline{16} \\
0
\end{array}
$$

Verification of the answer

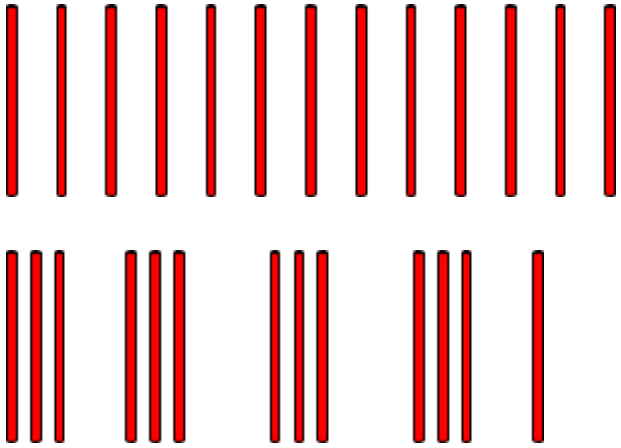
$$
\begin{array}{r}
140 \\
\times \quad 4 \\
\hline
560 \\
\hline
\end{array}
$$

Exercise 6.2

1. Write the dividend the divisor the quotient and the remainder in

$$\begin{array}{r} 8 \\ 9\overline{)74} \\ \underline{72} \\ 2 \end{array}$$

2. Set aside 13 sticks and make sets of 3 sticks.



(a) How many sets of 3 sticks were made – 4
(b) How many sticks were used to make them? -12
(c) How many sticks were left? - 1
(d) Write it in long division form

$$\begin{array}{r} 4 \\ 3\overline{)13} \\ \underline{12} \\ 1 \end{array}$$

3. If you have 18 one-rupee notes/coins and want to distribute them equally among 6 persons
   (a) How many one-rupee notes could you give to each person?
   (b) How many rupee notes were used?
   (c) How many rupee notes were left?
   (d) Write it in long division form.
4. If you have 21 one-rupee notes and wanted to distribute them equally among 4 persons
   (a) How many one-rupee notes could you give to each person?
   (b) How many one-rupee notes were used?

(c) How many one-rupee notes were left?
(d) Write it in long division form.

5. If you have 27 one-rupee notes and wanted to distribute them equally among 5 persons
   (a) How many one-rupee notes could you give to each person
   (b) How many rupee notes were used?
   (c) How many rupee notes were left?
   (d) Write it in long division form.
6. If you have 4 ten-rupee notes and 5 one-rupees and want to divide them equally among 3 persons.
   (a)How many ten-rupee notes can you give to each person?
   (b) How many ten-rupee notes were used?
   (c) How many ten-rupee notes were left?
   (d) Exchange leftover ten-rupees for one-rupee notes and combine these with one-rupees. How many one-rupee notes do you have now?
   (e) Distribute these equally among 3 persons. How many one-rupees could you give to each person?
   (f) How many one-rupee notes were used?
   (g) How many one-rupees were left?
   (h) How much money did each person get?
   (i) Write it in long division form.
7. Set aside 27 rupee notes using 2 ten-rupees and 7 one-rupee notes and distribute them equally among 5 persons, starting with ten-rupee notes.
   (a) How many ten-rupee notes could you give to each person?
   (b) How many ten-rupees were used?
   (c) How many ten-rupees were left?
   (d) Exchange leftover ten-rupee notes with one-rupees and combine these with one-rupees. How many one-rupee notes do you have now?
   (e) Distribute these equally among 5 persons. How many one-rupees could you give to each person?
   (f) How many one-rupees were used?
   (g) How many one-rupees were left?

(h) How much money did each person get?
(i) Write it in long division form.

8. Set aside 69 rupee notes using 6 ten-rupee notes and 9 one-rupee notes and distribute them equally among 6 persons, starting with ten-rupee notes.
   (a) How many ten-rupee notes could you give to each person?
   (b) How many ten-rupee notes were used?
   (c) How many ten-rupee notes were left?
   (d) Exchange leftover ten-rupee notes for one-rupee notes and combine these with one-rupee notes. How many one-rupee notes do you have now?
   (e) Distribute these equally among 6 persons. How many one-rupee notes could you give to each person?
   (f) How many one-rupee notes were used?
   (g) How many one-rupee notes were left?
   (h) How much money did each person get?
   (i) Write it in long division form.
9. Set aside 23 rupee notes using 2 ten-rupee notes and 3 one-rupee notes and distribute them equally among 4 persons, starting with ten-rupee notes.
   (a) How many ten-rupee notes could you give to each person?
   (b) How many ten-rupee notes were used?
   (c) How many ten-rupee notes were left?
   (d) Exchange leftover ten-rupee notes for one-rupee notes and combine these with one-rupee notes. How many one-rupee notes do you have now?
   (e) Distribute these equally among 4 persons. How many one-rupee notes could you give to each person?
   (f) How many one-rupee notes were used
   (g) How many one-rupee notes were left?
   (h) How much money did each person get??
   (i) Write it in long division form.
10. Set aside 451 rupee notes using 4 hundred-rupee notes, 5 ten-rupee notes and 1 one-rupee note and distribute them equally between 2

persons, starting with hundred-rupee notes.

(a) How many hundred-rupee notes could you give to each person?

(b) How many hundred-rupee notes were used?

(c) How many hundred-rupee notes were left?

(d) Exchange leftover hundred-rupee notes for ten-rupee notes and combine them with ten-rupee notes. How many ten-rupee notes do you have now?

(e) Distribute these equally among 2 persons. How many ten-rupee notes could you give to each person?

(f) How many ten-rupee notes were used?

(g) How many ten-rupee notes were left?

(h) Exchange leftover ten-rupee notes with one-rupee notes and combine them with one-rupee notes. How many one-rupee notes do you have now?

(i) Distribute these equally between 2 persons. How many one-rupee notes could you give to each person?

(j) How many one-rupee notes were used?

(k) How many one-rupee notes were left?

(l) How much money did each person get?

(m) Write it in long division form.

11. Set aside 531 rupee notes using 5 hundred-rupee notes, 3 ten-rupee notes, and 1 one-rupee note and distribute them equally among 4 persons starting with hundred-rupee notes.

(a) How many hundred-rupee notes could you give to each person?

(b) How many hundred-rupee notes were used?

(c) How many hundred-rupee notes were left?

(d) Exchange leftover hundred-rupee notes for ten-rupee notes and combine them with ten-rupee notes. How many ten-rupee notes do you have now?

(e) Distribute these equally among 4 persons. How many ten-rupee notes could you give to each person?

(f) How many ten-rupee notes were used?

(g) How many ten-rupee notes were left?

(h) Exchange leftover ten-rupee notes with one-rupee notes, how many one-rupee notes do you have?

(i) Distribute these equally among 4 persons. How many one-rupee notes could you give to each person?
(j) How many one-rupee notes were used?
(k) How many one-rupee notes were left?
(l) How much money did each person get?
(m) Write it in long division form.

12. Set aside 721 rupee notes using 7 hundred-rupee notes, 2 ten-rupee notes, and 1 one-rupee note and distribute them equally among 5 persons starting with hundred-rupee notes.
(a) How many hundred-rupee notes could you give to each person?
(b) How many hundred-rupee notes were used?
(c) How many hundred-rupee notes were left?
(d) Exchange leftover hundred-rupee notes for ten-rupee notes and combine them with ten-rupee notes. How many ten-rupee notes do you have now?
(e) Distribute these equally among 5 persons. How many ten-rupee notes could you give to each person?
(f) How many ten-rupee notes were used?
(g) How many ten-rupee notes were left?
(h) Exchange leftover ten-rupee notes with one-rupee notes and combine them with one-rupee notes. How many one-rupee notes do you have now?
(i) Distribute these equally among 5 persons. How many one-rupee notes could you give to each person?
(j) How many one-rupee notes were used?
(k) How many one-rupee notes were left?
(l) How much money did each person get?
(m) Write it in long division form.

13. Set aside 631 rupee notes using 6 hundred-rupee notes, 3 ten-rupee notes, and 1 one-rupee note and distribute them equally among 6 persons starting with hundred-rupee notes.
(a) How many hundred-rupee notes could you give to each person?
(b) How many hundred-rupee notes were used?
(c) How many hundred-rupee notes were left?
(d) Exchange leftover hundred-rupee notes for ten-rupee notes and

combine them with ten-rupee notes. How many ten-rupee notes do you have?

(e) Distribute these equally among 6 persons. How many ten-rupee notes could you give to each person?

(f) How many ten-rupee notes were used?

(g) How many ten-rupee notes were left?

(h) Exchange leftover ten-rupee notes with one-rupee notes and combine them with one-rupee notes. How many one-rupee notes do you have now?

(i) Distribute these equally among 6 persons. How many one-rupee notes could you give to each person?

(j) How many one-rupee notes were used?

(k) How many one-rupee notes were left?

(l) How much money did each person get?

(m) Write it in long division form.

14. Set aside 341 rupee notes using 3 hundred-rupee notes, 4 ten-rupee notes, and 1 one-rupee note and distribute them equally among 9 persons.

(a) How many hundred-rupee notes could you give to each person?

(b) How many hundred-rupee notes were used?

(c) How many hundred-rupee notes were left?

(d) Exchange leftover hundred-rupee notes for ten-rupee notes and combine them with ten-rupee notes. How many ten-rupee notes do you have now?

(e) Distribute these equally among 9 persons. How many ten-rupee notes could you give to each person?

(f) How many ten-rupee notes were used?

(g) How many ten-rupee notes were left?

(h) Exchange leftover ten-rupee notes with one-rupee notes and combine them with one-rupee notes. How many one-rupee notes do you have now?

(i) Distribute these equally among 9 persons. How many one-rupee notes could you give to each person?

(j) How many one-rupee notes were used?

(k) How many one-rupee notes were left?

(l) How many one-rupee notes were given to each person?
(m) Write it in long division form.

15. Set aside 843 rupee notes using 8 hundred-rupee notes, 4 ten-rupee notes and 3 one-rupee notes and distribute them equally among 8 persons.
(a) How many hundred-rupee notes could you give to each person?
(b) How many hundred-rupee notes were used?
(c) How many hundred-rupee notes were left?
(d) Exchange leftover hundred-rupee notes for ten-rupee notes and combine them with ten-rupee notes. How many ten-rupee notes do you have now?
(e) Distribute these equally among 8 persons. How many ten-rupee notes could you give to each person?
(f) How many ten-rupee notes were used?
(g) How many ten-rupee notes were left?
(h) Exchange leftover ten-rupee notes with one-rupee notes and combine them with one-rupee notes. How many one-rupee notes do you have now?
(i) Distribute these equally among 8 persons. How many one-rupee notes could you give to each person?
(j) How many one-rupee notes were used?
(k) How many one-rupee notes were left?
(l) How much money did each person get?
(m) Write it in long division form.

Exercise 6.3

Divide the following and verify your answer:

1. $3\overline{)73}$
2. $7\overline{)81}$
3. $6\overline{)72}$
4. $4\overline{)87}$
5. $8\overline{)64}$
6. $2\overline{)531}$
7. $8\overline{)941}$
8. $6\overline{)821}$
9. $9\overline{)213}$
10. $5\overline{)456}$
11. $7\overline{)803}$
12. $7\overline{)743}$
13. $3\overline{)450}$
14. $4\overline{)423}$
15. $9\overline{)213}$
16. $5\overline{)456}$
17. $7\overline{)803}$

Exercise 6.4

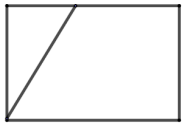
1. If there are 36 eggs, and you want to pack those in trays that can hold 6 eggs. How many egg trays are needed?
2. A cash prize of 500 rupees was distributed equally among 5 participants in a dance. How much money did each participant get?
3. A class has 44 students. These are assigned equally to the four houses of the school. How many students from that class are in each house?
4. Kamal had a 50-rupee note and he wanted to buy notebooks each costing 8 rupees. Does he have enough money to buy 6 notebooks? Explain.
5. Five persons can be seated in a car. If 28 people want to go for a picnic, how many cars would be needed?
6. Awani bought a bag of sweets to distribute to her classmates on her birthday. The bag contained 63 sweets, she gave 2 sweets to each and 5 sweets were left over. How many children were present on that day?
7. Makeup stories that require the following calculations:
   (a) $4 \div 2$
   (b) $12 \div 4$
   (c) $30 \div 6$
   (d) $20 \div 5$
   (e) $24 \div 12$

UNIT 7

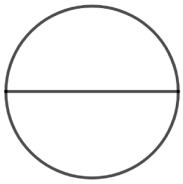
Fractions

Concept of equal and unequal parts

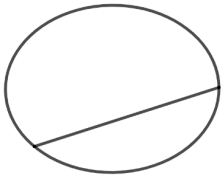
The shapes given below are divided into two parts by a line, mark a √ under the shapes in which the two parts are equal.



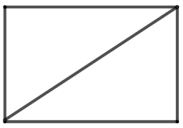
(a)



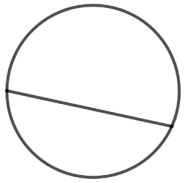
(b)



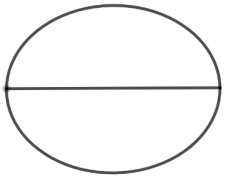
(c)



(d)



(e)



(f)

Regional model

If a region can be divided into 2 equal parts, each part represents one-half. We write it as $\frac{1}{2}$.

If a region can be divided into 4 equal parts, then

One part represents one-fourth. We write it as $\frac{1}{4}$.

Two parts represent two-fourths. We write it as $\frac{2}{4}$.

Three parts represents three-fourths. We write it as $\frac{3}{4}$.

Activity 1

Cut out 4 strips from Activity Sheet 6.1.

A strip represents one whole. Write “one whole” on the fraction strip.

Pick another strip, fold it and cut it into two equal pieces. How much is each strip? (half or $\frac{1}{2}$)

Label the strip using both the word and the fractional representation

Pick one more strip, fold it twice and cut the first fold. What does the small small strip represent? ($\frac{1}{4}$)?

Label the strip using both the word and the fractional representation.

What does the remaining strip represent?

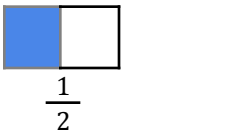
Label the strip using both the word and the fractional representation

Is the length of two-fourths of the strip the same as half of the strip?

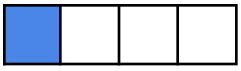
Check by folding the strip twice and cut it on the second fold to find two-fourths of the strip and compare it with the strip labeled half.

When two strips are of the same length, they represent equivalent fractions.

The fraction under each of the figures shows the part of the whole region that is shaded.



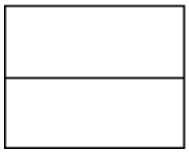
$\frac{1}{2}$

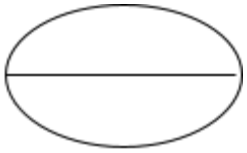


$\frac{1}{4}$

$\frac{3}{4}$

If we can divide any region into two equal parts, then each part is one-half or $\frac{1}{2}$ of the original region



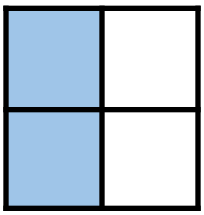


If we can divide a region into four equal parts, each part is one-fourth or $\frac{1}{4}$ of the original region. Two parts are two-fourths or $\frac{2}{4}$. Three parts are three-fourths or $\frac{3}{4}$.

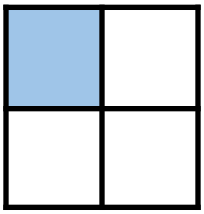
All the parts or $\frac{4}{4}$ constitute a whole.

The figures given below show the part of the region shaded in each figure

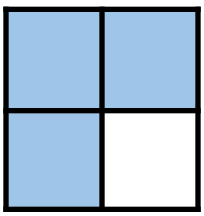
$\frac{1}{2}$



$\frac{1}{4}$

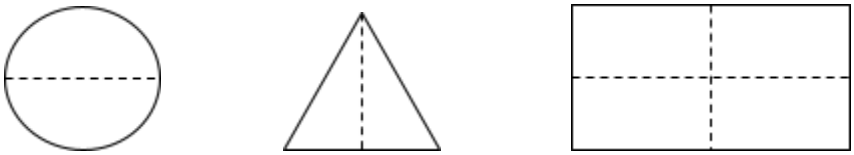


$\frac{3}{4}$

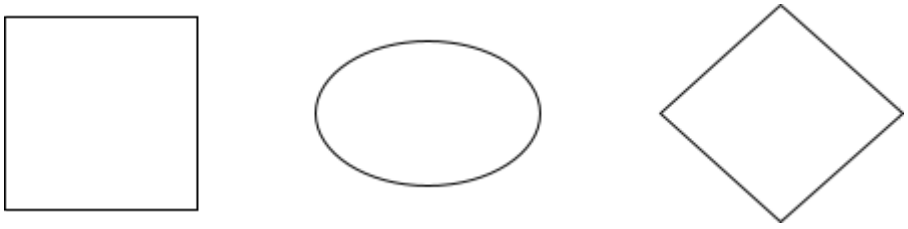


Exercise 7.1

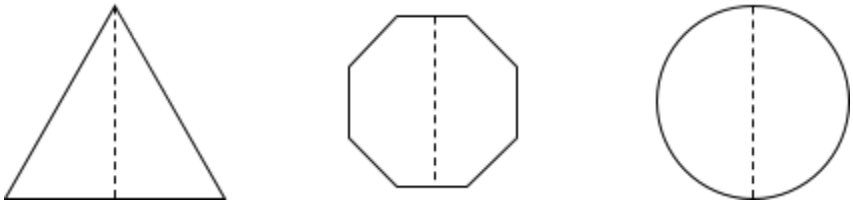
1. Cut the shapes given in Activity Sheet 6.2 and fold and cut these so that two parts cover each other exactly. How much is each part?
2. Trace and shade or colour one-half of the figures given below:



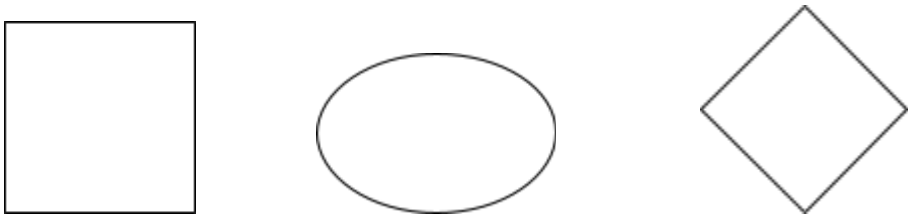
3. Trace the following shapes, cut and fold them in as many ways as you can so that two parts cover each other exactly.



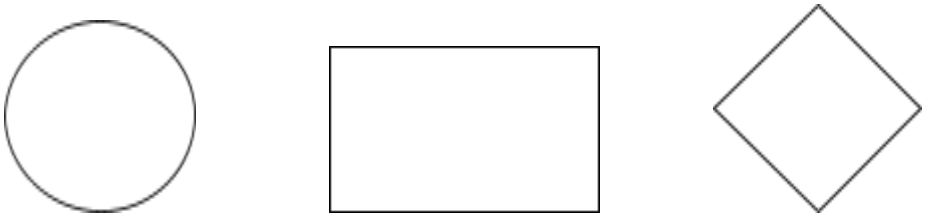
4. Trace and colour one-half of the figures given below.



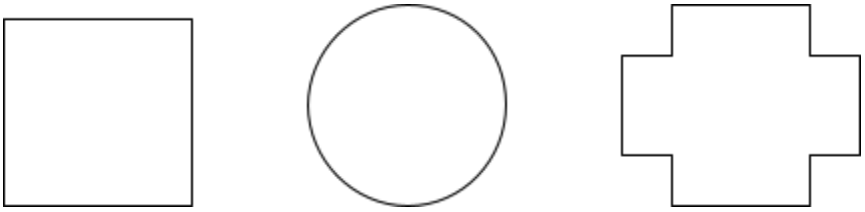
5. Trace and cut the following shapes. Fold these so that two parts cover each other exactly. Fold these again so that two parts cover each other exactly. Open the paper and shade one-fourth of the shape.



6. Trace and cut the following shapes. Fold them so that two parts cover each other exactly. Fold these again so that two parts cover each other exactly. Open the paper and shade two-fourths of the cut shape.



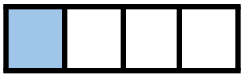
7. Trace and cut the following shapes. Fold these so that two parts cover each other exactly. Fold these again so that two parts cover each other exactly. Open the paper and shade three-fourths of the cut shape.



8. What parts of the following strips are shaded?

(a)

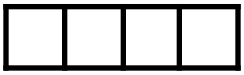
(b)



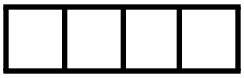
(c)

(d)

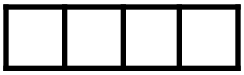
9. Shade or colour one-fourth of the figure given below



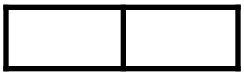
10. Shade or colour two-fourth of the figures given below

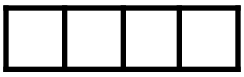


11. Shade or colour three-fourth of the figure given below

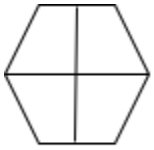


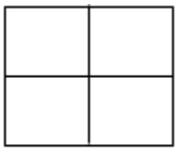
12. Shade or colour half of the figures given below

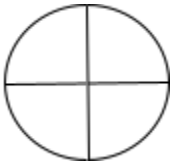




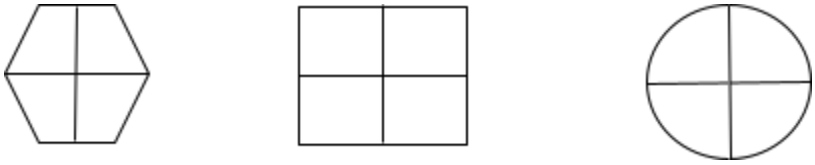
13. Is two-fourths of the region the same as one-half of the region?
14. Shade $\frac{1}{2}$ of the figures given below.



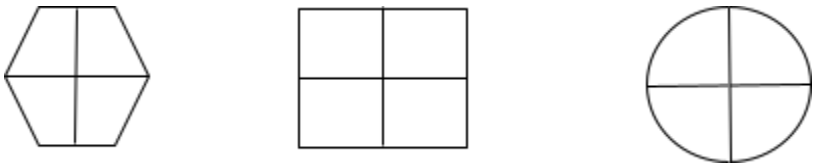




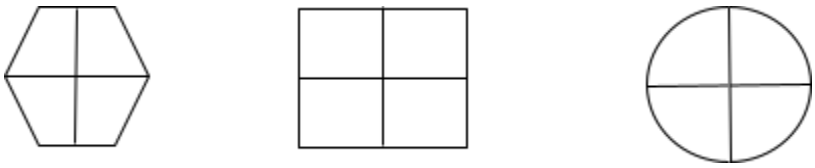
15. Shade $\frac{1}{4}$ of the figures given below.



16. Shade $\frac{2}{4}$ of the figures given below.



17. Shade $\frac{3}{4}$ of the figures given below.



18. Is two-fourths of the region the same as one-half of the region?

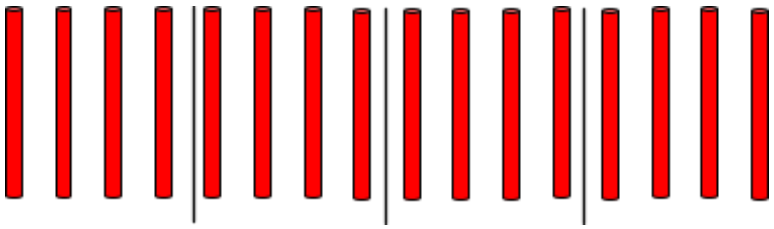
Set Model

Half

If we can divide a number of objects, say 6 into two equal sets, we say each set contains half of the objects in the original collection.
The number of objects in each set 3 is said to be half of 6.
This is the same as dividing by 2. Thus we can find one-half of the objects by dividing the number of objects by 2.

Fourths

If we can divide the number of objects, say 16 sticks, into four equal sets, we say each set contains one-fourth of the objects in the original collection.
As each set would have 4 objects. We can also say 4 is one-fourth of 16.
This is the same as dividing 16 by 4. Thus we can find one-fourth of the objects by dividing the number of objects by 4.
Two-fourths of sticks can be found by counting the number of sticks in two sets which is 8. Therefore two-fourth of 16 is 8, the same as half of 16.
Three-fourths of sticks can be found by counting the number of sticks in three sets. Therefore three-fourth of 16 is 12



Exercise 7.2

1. Set aside the following number of sticks. If you divide them into two equal sets how many sticks will each set have?
   (a) 2 (b) 4 (c) 8 (d) 10
2. Shade half of the circles in each of the sets below:
   (a) ○ ○
   (b) ○ ○ ○ ○
   ○ ○ ○ ○
   (c) ○ ○ ○ ○
   ○ ○ ○ ○
   ○ ○ ○ ○
3. Shade two-fourth of the circles in each of the sets given below:
   (a) ○ ○
   (b) ○ ○ ○ ○
   ○ ○ ○ ○
   (c) ○ ○ ○ ○
   ○ ○ ○ ○
   ○ ○ ○ ○
4. Is two-fourths the same as one-half?
5. Shade one-fourths of the circles in each of the sets given below:
   (a) ○ ○ ○ ○
   (b) ○ ○ ○ ○
   ○ ○ ○ ○
   (c) ○ ○ ○ ○
   ○ ○ ○ ○
   ○ ○ ○ ○
6. Shade three-fourths of the circles in each of the sets given below:
   (a) ○ ○ ○ ○
   (b) ○ ○ ○ ○ ○ ○ ○ ○

UNIT 8

Money

Review of Money

1. In what denominations (The worth of a note) is money available in India?
2. How many paise are there in a rupee?
3. Convert the following rupees to paise:
   5 rupees = _____ paise
   1 rupee and 40 paise = _____ paise
   6 rupees and 60 paise = _____ paise
4. Convert the paise given below to rupees:
   400 paise = _____ rupees
   600 paise = _____ rupees
   125 paise = _____ rupees and _____paise
   470 paise = _____ rupees
5. Write the following amounts of money in short form:
   (a) 3 rupees and 35 paise
   (b) 7 rupees and 50 paise
   (c) 4 rupees and 5 paise

Rounding off to nearest rupee

The paise used to come in the denomination of 1 paisa, 2 paise, 5 paise, 10 paise, 20 paise, 25 paise and 50 paise. But because of inflation, they are not minted or used anymore. However, the prices of many things involve paise e.g. price of domestic gas, price of petrol. Rupees are rounded to the nearest rupee for buying and selling.

If the price of something involves rupees and paise, we pay only the rupees part if paise are less than 50; and pay one rupee for paise more than or equal to 50 paise.

For example, if the prices of different things are as follows, we pay the amount shown against them:

Rs 56.25 → Rs 56

Rs 331.65 → Rs 332

Rs 140.50 → Rs 141

Shopping

When we do shopping, we often need to add and subtract money, and multiply or divide it by a number or do more than one of these to find out how much money to pay to the shopkeeper.

If we express the money in short form, we can add and subtract money as in numbers. Always write the rupees with two digits after the dot. If 1 to 9 paise are involved, write it as 01, 02, 03… after the dot and if no paise are involved you may write two zeros after the dot e.g. Rs 35 as 35.00.

We can also multiply rupees and paise by a number as in numbers remembering to write the dot after two digits from the right if paise are involved.

We can also divide rupees and paise by a number as in numbers remembering to write the rupees with two zeros after the dot if no paise are involved. When finding the quotient, write Rs. before the quotient and a dot for numbers above the dot in the dividend to indicate that these are paise.

Example 1

Anita bought chocolate costing Rs. 7.50, a packet of potato chips for Rs. 12, and a cold drink for Rs. 10. How much money should she give to the shopkeeper?

She should give to the shopkeeper

```
  Rs.  7.50
  Rs. 12.00
+Rs. 10.00
 ----------
  Rs. 29.50
 ----------
```

Example 2

Rajan has 65 rupees and Sanjay has 100 rupees. How much more money does Sanjay have than Rajan?

```
  Rs. 100
- Rs.  65
=Rs.  35
```

Sanjay has Rs. 35 more than Rajan

Example 3

The cost of an apple is Rs. 4.50 rupees. If Raman has 30 rupees, does he have enough money to buy 6 apples?

The cost of 6 apples is

```
  Rs.   4.50
×          6
  -----------
  Rs. 27.00 = Rs. 27.
  -----------
```

As Raman has 30 rupees, he has enough money to buy 6 apples.

or you can estimate it quickly as Rs. 30 ÷ 6 = Rs. 5 and as the cost of an apple is less than Rs. 5, Raman has enough money to buy them.

Example 4

Sunita bought potatoes worth 7 rupees and 50 paise, onions worth 10 rupees and tomatoes worth 5 rupees, and 50 paise and beans for Rs 6. How much money should she pay the vegetable vendor?

The cost of vegetables Sunita bought is

```
  Rs.   7.50
  Rs. 10.00
  Rs.   5.50
+Rs.   6.00
-------------
=Rs. 29.00
-------------
```

If she pays the vendor a 50-rupee-note, how much money should he return to her?

The vendor should return to her

```
   Rs. 50
 - Rs. 29
----------
= Rs. 21
----------
```

Example 5

Aditya bought 6 bananas. If a banana costs 1 rupee and 25 paise, how much money did he spend on bananas?

Aditya spent

```
  Rs. 1.25
×        6
  ----------
  Rs. 7.50
  ---------
```

If he also bought a watermelon costing 24 rupees. How much money did he spend in all?

He spent

```
 Rs.    7.50
+Rs.   24.00
 ------------
 Rs.   31.50 in all.
 ------------
```

Example 6

Six friends decided to go to a movie if the total cost of tickets for all of them is Rs 420, how much should each pay?

Each should pay 70 rupees, as Rs. 420÷70 = Rs. 6

Example 7

If the cost of 6 pencils is Rs. 18, how much is the cost of

(a) 1 pencil?

(b) 3 pencils

(a)The cost of 1 pencil is Rs. 18 ÷ 6 = Rs 3.

(b) The cost of 3 pencils is Rs. 3 × 3 = Rs. 9

Exercise 8

1. How many paise does a rupee have?
2. How many 10-rupee notes would you get for a hundred-rupee note?
3. How many 20-rupee notes should you get for a hundred-rupee note?
4. Convert the paise given below to rupees:
   300 paise = _____ rupees
   125 paise = _____ rupees and _____paise
   470 paise = _____ rupees and _____paise
5. Convert the following rupees to paise:
   3 rupees = _____ paise
   7 rupee and 20 paise = _____ paise
   7 rupees and 56 paise = _____ paise
6. Write the following amounts of money in short form:
   (a) 3 rupees and 35 paise
   (b) 7 rupees and 50 paise
   (c) 4 rupees and 5 paise
   (d) 100 rupees
7. Round off the following to the nearest rupee:
   46 rupees and 25 paise
   18 rupees and 72 paise
   104 rupees and 50 paise
8. Bilal had 50 rupees. He bought a toy costing 26 rupees. How much money is left with him?
9. Gita bought chocolate costing Rs. 5.50, a cake costing Rs. 12, and potato chips costing Rs. 10.
   (a) How much money should she give to the shopkeeper?
   (b) If she gave a 50-rupee note to the shopkeeper, how much money should he return to her?
10. Suman has 25 rupees and her brother has 100 rupees. How much more money does her brother have?
11. Ranjana bought potatoes worth 12 rupees and 50, onions worth 15 rupees and tomatoes worth 6 rupees and 50 paise.
    (a) How much money should she pay the vegetable vendor?

(b) If she pays the vendor a 100-rupee note, how much money should the vendor return to her?

12. If oranges are Rs 36 a dozen (1 dozen = 12), what will be the cost of
    (a) 1 orange
    (b) 4 oranges
13. The price of potatoes is Rs 16 per kg, what would be the cost of
    (a) 3 kg of potatoes?
    (b) $\frac{1}{2}$kg of potatoes?
    (c) $\frac{1}{4}$kg of potatoes?
    (d) $2\frac{1}{2}$ kg of potatoes?
14. How does a shopkeeper use the following operations in his daily work:
    (a) addition
    (b) subtraction
    (c) multiplication
    (d) division
    (e) fractions

UNIT 9

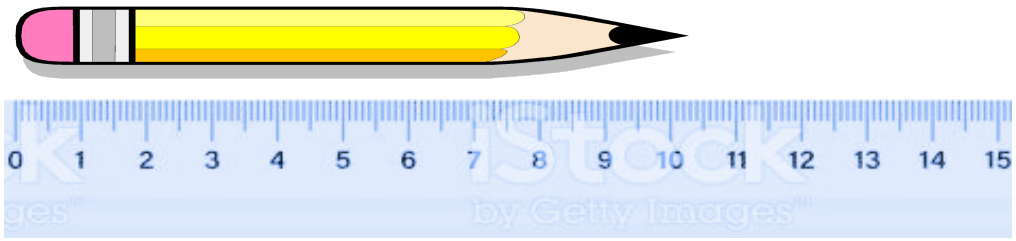
Length

Show the video: https://youtu.be/Ll21j2r8gDc?t=304
We often need to measure the length, height, or distance of objects.
The standard unit for measuring length is a **metre**, we write it in short form as m. You would have seen a cloth merchant measuring lengths of cloth with a metre rod that is divided into 4 or 10 equal parts.
A tailor needs more precision. He uses tape to take measurements for stitching. A tape has 100 equally spaced markings numbered 1 to 100 on the tape. The distance between two adjacent markings is one **centimetre**. We write it in short form as cm.
1 metre = 100 cm.
Show children a metre by showing a metre rod or a metre long stick and ask children to make a list of five things that are about a metre long, more than a metre long, and less than a metre long.
Show children a tape marked in m and cm and ask them to measure the length and width of a room, length of a blackboard, teacher's table.

Centimetre ruler
We can use a 15 or 30-centimetre ruler to measure the length of small objects such as pencil, notebook, pen, brush by keeping these in a horizontal or vertical position. Then keep the ruler adjacent to the object with zero at one end of the object and read the ruler marking at the other end as in the figure given below and read the reading on the ruler that coincides with the end of the object.
The length of the crayon is 7 cm

Measuring to the nearest centimetre

If the thing that you may want to measure does not have a number marked above the second edge but falls between two numbers, then take the number that is nearer to it as its measure. It is called measuring to the nearest centimetre. If it falls exactly in the middle of two numbers, we take the larger number as its measure to the nearest centimetre.



For example, the length of the pencil is between 10 and 11 cm, but it is closer to 10 cm, we say its length to the nearest centimetre is 10 cm.

Measuring to the nearest milliimetre

The rulers also have finer markings between cm. Note that each centimetre has 10 equally spaced smaller markings, each of which is called a **milliimetre**. We write it in short form as mm.

1 centimetre = 10 millimetres

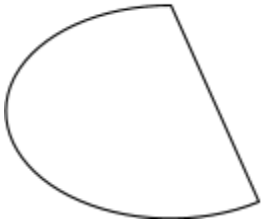
We can thus convert centimetres into millimetres by multiplying the centimetres by 10.

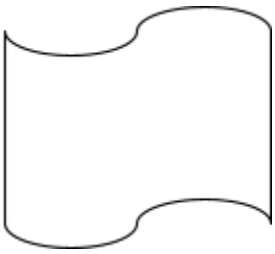
Thus 2 cm = 20 mm, 3 cm = 30 cm, 4 cm = 40 mm and so on.

We can measure a length more accurately by reading the millimetre markings. As the millimetre marking is 2 after the centimetre marking 10. The length of the pencil given above is 10 cm and 2 mm.

Measurement of curved lines or distances around objects with curved edges

A ruler cannot be used for measuring curved lines such as the ones given below. You can measure these by keeping a string over them and then measure the length of the string by using a ruler.





Exercise 9.1

1. How many centimetres are there in a metre?
2. How many millimetres are there in a centimetre?
3. Convert the following to millimetres:
   (a) 2 cm (b) 5 cm (c) 4 cm 4 mm
   (d) 8 cm 7 mm (e) 9 cm 1 mm (f) 10 cm 7 mm
4. What units would you use for measuring the length of the following objects-metre or centimetre?
   (a) a chalk (b) a blackboard (c) a pencil
   (d) a matchbox (e) a toothbrush (f) a room
5. Measure the length of the line segments given below to the nearest centimetre.
   (a) _____

   (b) _____

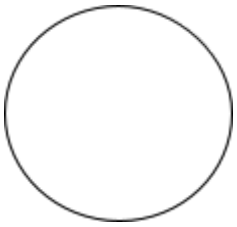
   (c) _____

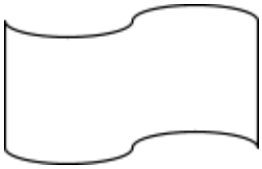
   (d) _____
6. Measure the length of the following objects to the nearest centimetre:
   (a) a new crayon (b) mathematics notebook (c) a new pencil
   (d) a ten-rupee note (e) mathematics book (f) a matchbox
7. Draw arrows in Activity Sheet 8 and to show
   (a) 3 cm (b) 6 cm 5 mm (c) 3 cm 3 mm (d) 10 cm 8 mm
8. Draw line segments whose lengths are given below:
   (a) 1 cm
   (b) 3 cm
   (c) 5 cm 4 mm
   (d) 7 cm 2 mm
9. Using the edge of your book draw lines that you think are 6, 8. 12 cm long. Under each of your line segments, draw lines with the help of a ruler that is as long as the line segment was supposed to be.
   Were your line segments too large or too short? Can you do better next time?

10. Measure the lines given below using a string first and then find out the length of the string to the nearest centimetre by the ruler.

(a)

(b)

(c) 

(d) 

11. A metre is about the height of a

A. a door B. a table C. a chair

12. Which of the following would you measure in centimetres or millimetres?

(a) length of a sharpener

(b) length of cloth for a suit

(c) Length of a paper clip

(d) Length of playground

13. A milliimetre is about the

A. thickness of a rupee coin

B. thickness of a pencil sharpener

14. The height of a very tall man in cm is about

A. 20

B. 200

C. 2000

15. Give situations in daily life that require measurement of length.

Addition and subtraction of length in metres and centimetres and multiplication of length in metres and centimetres by a number

Many situations require addition of length e.g. when we want to know how much electric wire to buy for connecting two different appliances to an electric connection. Other situations require subtraction of length e.g. when a shopkeeper who had a roll of water pipe 50 m long, sold 15 m and wants to know how much is left.

Some other situations require multiplication of length by a number e.g. if one wants to know how much ribbon to buy for making four ribbons of a specified length.

We can add and subtract lengths like numbers if these have the same units m or cm. However, their sum or difference is in m or cm. Similarly, we can multiply m or cm by a number just like numbers, but the product is in m or cm.

If a measure involves m and cm, then we add cm to cm and m to m. Similarly, we multiply m and cm separately by the number.

If after addition or multiplication the number of cm is more than 100, we convert 100 cm to 1 m, 200 cm to 2 m, 300 cm to 3 m, and so on and add that to m in the sum or product.

Similarly, we subtract cm from cm and, m from m. If in subtraction the number of cm to be subtracted is more, then we rename 1 m as 100 cm and add that to cm and reduce the number of m by 1.

Example 1

Add

345 m	25 cm	10 m 50 cm
+278 m	+50 cm	+ 8 m
---	---	---
623 m	75 cm	18 m and 50 cm
---	---	---

Example 2

Add

```
  5 m 50 cm
+2 m 80 cm
----------
  7 m 130 cm
=7 m + 1 m and 30 cm
=8 m and 30 cm
```

Example 3

Subtract

```
                                  9        1
  385 m            80 cm          10 m and 80 cm
–239 m            –50 cm         –  6 m and 25 cm
----------        ----------          ----------.
  146 m            30 cm            4 m and 55 cm
----------        ----------          ----------
```

Example 4

Find 6 m 50 cm – 2 m 80 cm

Since we cannot subtract 80 cm from 50 cm, we rename a metre as 100 cm and add to 50 cm. Thus 6 m and 50 cm can be written as 5 m and 150 cm and now we can subtract m from m and cm from cm.

```
  5 m 150 cm
–2 m 80 cm
----------
  3 m 70 cm
----------
```

Example 5

A lady bought 2 m and 75 cm of cloth for her shirt and 2 m and 25 cm of cloth for her salwar. How much cloth did she buy in all?

```
Cloth bought for the shirt      2 m 75 cm
Cloth bought for the salwar    +2 m 25 cm
                               ----------
Total cloth bought              4 m 100 cm = 5 m.
```

Example 6

A man bought 10 m of rope. He used 2 m 25 cm for tying a cow to a tree..
How much rope does he have now?
(10 m – 2 m and 25 cm)
Since we cannot subtract 25 cm from 0 cm, we rename a metre as 100 cm.
Thus, we can write 10 m as 9 m and 100 cm.

Rope bought	9 m 100 cm
Rope used up	–2 m 25 cm

Rope left	7 m 75 cm

Example 7

Aruna bought 4 ribbons each of them 75 cm long. How much ribbon did she buy in all?

Length of 1 ribbon	75 cm
Length of 4 ribbons	× 4
	300 cm

The total length of ribbon bought by Aruna = 300 cm = 3 m

Exercise 9.2

1. Find
   (a) 576 m 25 cm +359 m 55 cm
   (b) 3 m and 25 cm + 1 m and 75 cm
   (c) 23 m and 30 cm +18 m and 85 cm
   (d) 248 m and 50 cm + 53 m and 70 cm
2. Find
   (a) 785 m and 90 cm – 259 m and 46 cm
   (b) 8 m and 80 cm – 6 m and 25 cm
   (c) 6 m and 50 cm – 2 m and 80 cm
   (d) 14 m and 30 cm – 5 m and 50 cm
   (e) 463 m and 50 cm – 278 m and 70 cm
3. A man bought a 25 m long water pipe. He used 1 m of that for connecting a washing machine to a tap. How much of the pipe is left with him?
4. A shopkeeper bought 125 m, 258 m, and 362 m of different types of cloth on a particular day. How much cloth did he buy in all?
5. A floor is covered with 50 cm square tiles. If there are 8 tiles along the length of the room. How long is the room?
6. Sunita cut a ribbon 3 metres long into 4 equal pieces. How much was the length of each ribbon?

UNIT 10

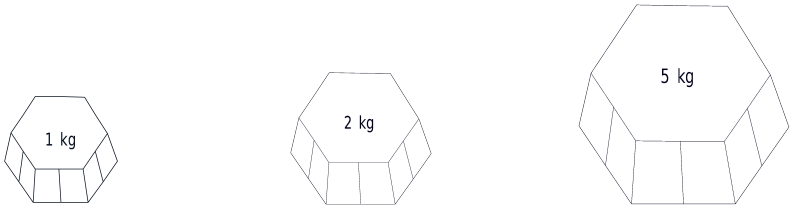
Weight

Show the video: https://youtu.be/ZFL1IUNWUZQ?t=194

You would have seen a vegetable vendor or a grocer weighing things with a balance and a set of blocks. He puts the block e.g. 1 kg on one side and the things on the other side. He goes on adding or removing things until the balance does not tilt to either side to weigh 1 kg.

The kilogram is the standard unit for weight and is written in short as kg.

Some commonly used blocks for measuring weight are given below:



We measure the weight of lighter objects by using a smaller measure called **gram** that is written in short as g.

1 kg = 1000 g.

Some commonly used blocks for small measures of weight are given below:

50-gram 100-gram 200-gram 500-gram

If an object needs to be balanced by using both kg and g, say 2 kg and 500 g, then its measure may be written as 2 kg 500 g or 2 kg and 500 g.

One or more of these weights may be used to weigh different amounts of things.

We need two 500 g weights to balance 1000 g or 1 kg.

Therefore 500 g is $\frac{1}{2}$ of 1000 g or 1 kg.

We need four 50 g weights to balance 200 g.

Therefore 50 g is $\frac{1}{4}$ of 200 g.

Example 1

The cost of one kg of almonds is Rs 400, Find the cost of 250 g.

It would be one-fourth of Rs. 400. We can find it by dividing 400 by 4.

As $400 \div 4 = 100$, the cost of 250 g of almonds would be Rs 100.

Exercise 10.1

1. What are the units for measuring weight?
2. How many g are there in one kg?
3. If you have 50 g, 100 g, 200 g, 500 g, 1 kg, 2 kg, and 5 kg blocks of weights. What weight or combination of weights would you use to weigh the following amounts of things.:
   (a) 500 g (b) 150 g (c) 1 kg 500 g
   (d) 250 g (e) 600 g (f) 3 kg 750 g
4. If you have only the following blocks of weights, how will you weigh the following amounts:
   (a) 4 kg given only 5 kg and 1 kg blocks
   (b) 800 g given only a 1 kg and 200 g block
   (c) 500 g given only 1 kg block
5. What units kg or gram would you use to weigh the following objects:
   (a) a gold bangle (b) a sack of rice
   (c) a spice (d) a sack of wheat
6. Fill in the blanks with appropriate fractions:
   (a) 500 g = ____ one kg
   (b) 250 g = ____ one kg
   (c) 750 g= ____ one kg
7. If the cost of a pulse is Rs 16 per kg, what will be the cost of the following amounts of pulse:
   (a) 2 kg
   (b) 500 g
   (c) 250 g
8. If the cost of 5 kg of rice is Rs 100, what will be the cost of the following amounts of rice:
   (a) 1 kg
   (b) 2 kg
   (c) 500 g
   (d) 250 g
9. Round off the following to the nearest 100 gram
   (a) 420 g
   (b) 580 g

(c) 1 kg 780 g
(d) 3 kg

10. Weigh the following objects
    (a) your math book
    (b) your math notebook
    (c) your lunchbox
11. Were you able to find its exact weight for the objects in Q. 10 with the standard weights? If not, how did you report the weight?

Take-Home

Estimate the number of beans (rajma, channa) in a jar and report to the class how you estimated it.

Addition and subtraction of weight

Many situations require the addition of weight e.g. when we buy a number of vegetables with different weights and want to know how much weight we would have to carry?
Other situations require subtraction of weight e.g. when a shopkeeper had a number of kg of a food item and sold some of it and wants to know how much is left to decide how much more to buy this week.
You can add and subtract weight like numbers if they both have the same units-g or kg. For example

5 kg	500 g	400 g
+4 kg	+250 g	- 250 g
---	---	---
9 kg	750 g	150 g
---	---	---

If measures of the weight of one or both objects are a certain number of kg and a certain number of g, then add g to g and kg to kg. If the number of g in sum or product is equal to or more than 1000, we convert that to the highest multiple of 1000 g + g, convert the multiple of 1000 to that many kg and add the kg to the sum or product in kg.
For example, we write 1700 g = 1000 g + 700 g = 1 kg and 700 g
1050 g as 1000 g + 50 g = 1 kg and 50 g

Example1

2 kg 500 g
+1 kg 200 g
---
3 kg 700 g

Example2

5 kg 750 g
+3 kg 500 g

= 8 kg 1250 g
= 8 kg + 1 kg + 250 g
= 9 kg 250 g

Similarly, we subtract g from g and kg from kg. If the no of g to be subtracted is more, then we borrow 1 kg from kg, rename it as 1000 g, and add that to g and then subtract the g from g.

Example 3

```
  4 kg 500 g
- 2 kg 250 g
----------------
  2 kg 250 g
----------------
```

Example 4

Find 4 kg 500 g - 2 kg 750 g

As the number of g to be subtracted 750 is more than 500, we write 4 kg 500 g as 3 kg + 1000 g + 500 g = 3 kg 1500 g. Subtracting g from g we have 1500 – 750 =750 and kg from kg we have 3 – 2 = 1 which we can write in vertical form as

```
  3 kg 1500 g
 -2 kg   750 g
-----------------
  1 kg 750 g
-----------------
```

Rounding off **to the nearest kilogram**

If the number of kilograms is large, we may round off to the nearest kilogram. If the number of grams is less than 500, we ignore the grams. If the number of grams is 500 or more than 500, we round off the kilograms to one more kilogram.

For example, we would round off 350 kg 400 g to 350 kg, 720 kg 700 g to 721 kg, and 575 kg 500 g to 576 kg.

Converting kilograms to grams and grams to kilograms

If we have only kilograms, we can convert them to grams by counting by thousand as many thousands as the kilograms.

For example 1 kg = 1000 g, 4 kg = 4000 grams

If we have both kilograms and grams, we can convert them to grams by first converting the kilograms to grams by counting as many thousands as the number of kg and adding grams to that.

For example, 1 kg and 400 g = 1000 g + 400 g = 1400 g
4 kg and 500 g = 4000 g + 500 g = 4500 g.
We can convert grams to kilograms by using the first 3 digits beginning from right as grams and the remaining digits in thousands as kilograms. For example,
6,000 g = 1 kg and 0 g
7,500 g = 7 kg and 500 g
4,050 g = 4 kg and 50 g
1,008 g = 1 kg and 8 g

Exercise 10.2

1. How many grams are there in one kilogram?
2. Convert the following to grams:
   (a) 5 kg
   (b) 3 kg and 400 g
   (c) 1 kg and 50 g
3. Fill in the blanks:
   500 g = ___kg
   250 g = ___ kg
4. Convert the following to kilograms
   (a) 4,000 g
   (b) 7,600 g
   (c) 2,060 g
   (d) 2,005 g
5. Add the following:
   (a) 500 g + 250 g
   (b) 250 g + 200 g
   (c) 378 kg + 265 kg + 132 kg
   (d) 2 kg 500 g + 3 kg 700 g
6. Subtract the following:
   (a) 6 kg 500 g - 3 kg 250 g
   (b) 25 kg 200 g - 8 kg 500 g
7. A man bought 2 kg onions, 1 kg potatoes, and 1 kg tomatoes. How much weight would he have to carry?
8. A lady bought 550 g of apples and 250 g of grapes. How much fruit did she buy?
9. A shopkeeper had 357 kg of sugar at the beginning of a month. He sold 238 kg 500 gram of sugar during the month. How much sugar does he have now?
10. A truck is carrying 500 kg of wheat, 385 kg of rice and 150 kg of pulses. How much weight did the truck carry?
11. Makeup stories that require the following calculations:
    (a) 3 kg + 2 kg
    (b) 500 g – 200 g

UNIT 11

Volume

Show the video: https://youtu.be/TkXxn0bJ4r0?t=8
The amount of liquid in a container is called its **volume**.
The maximum amount a container can hold is called its **capacity**.
Again, we need standard units so that everyone's measures of volume would be the same.
The standard unit for measuring volume is a **litre**, written in short form as *l*
Show containers that have a capacity of one litre.
We measure the volume of smaller amounts in **millilitres,** written in short form as *ml*.
1 litre = 1000 millilitres.
Show some standard containers that have smaller capacity such as milk bottles, coke and medicine bottles.
We also need to find smaller amounts of liquids e.g. milk for a recipe.
We can measure smaller amounts by a measuring cup that has millilitres marked on it.
Show a measuring cup and how to use it to measure the capacity of different containers or measure different amounts of liquid by it.
Some commonly used containers with different capacities in litres and millilitres are given below:

1 litres

2 litres

5 litres

Ask students to bring some containers from home that specify the amount they can hold e.g. milk bottles, cola bottles, medicine bottles, measuring cups, etc.
Ask the students to estimate the amount of water they will hold.

Pictures of containers that contain different amounts of liquids and a measuring cup are given below:

100 *ml*

200 *ml*

250 *ml*

We need to measure two 500 ml containers to measure 1000 ml.

Therefore, 500 *ml* is $\frac{1}{2}$ of 1000 *ml* or 1*l*.

We need four 250 *ml* cups to measure 1000 *ml*.

Therefore, 250 *ml* is $\frac{1}{4}$ of 1000 *ml* or 1 *l*

We need two 100 *ml* cups to measure 200 *ml*.

Therefore, 100 *ml* is $\frac{1}{2}$ of 200 *ml*.

You can verify these using appropriate containers.
Such relations are useful in shopping.
For example, if the cost of one litre of milk is Rs. 18, the cost of half a litre of milk would be one-half of Rs. 18 which is Rs. 9(18÷2).

Rounding off to the nearest litre

If the number of litres is large, we may round off to the nearest litre.
If the number of millilitres is less than 500, we ignore the millilitres. If the number of millilitres is 500 or more than 500, we round off the litres to one more litre.
For example, we would round off 350 litres 400 millilitres to 350 litres, 720 litres 700 millilitres to 721 litres, and 575 litres 500 millilitres to 576 litres.

Exercise 11.1

1. Measure larger amounts of liquid using standard containers of lower capacity.
2. How would you compare the capacity of two containers?
3. What are the units for measuring capacity?
4. Name some things that you buy in litres.
5. Name some things that you buy in millilitres.
6. Bring small containers of coke bottles, medicine bottles and measure the capacity of some other containers using those.
7. Estimate the capacity of given containers and check by using standard containers of smaller capacity.
8. Give examples of situations that require measurement of capacity.
9. How many milliltres are there in one litre?
10. If milk is available in 500 millilitres pouches and you want to buy 1 litre of milk. How many pouches of milk should you buy?
11. If you have containers that can measure 50 *ml*, 100 *ml*, 200 *ml*, 500 *ml*, 1*l*, 2 *l*, 5 *l*; give the minimum number of standard weights that you would use to measure the amounts of liquids given below.
    (a) 500 *ml* (b) 150 *ml* (c) 1 *l* 500 *ml*
    (d) 250 *ml* (e) 400 *ml* (f) 3 *l* 750 *ml*
12. How will you measure the following amounts of water given only the specified
    containers:
    (a) 4 litres given only 3 litre and 1-litre containers
    (b) 3 litres given only 2 litre and 5-litre containers
    (c) 300 ml given only 100 ml containers
    (d) 5 litres given only 2 litre and 1-litre containers
13. Express the following as a fraction of 1 *l*
    (a) 500 *ml*
    (b) 250 *ml*
    (c) 750 *ml*
14. If the cost of milk is Rs 16 per litre, what will be the cost of the following amounts of milk:
    (a) 2*l*

(b) 500 *ml*

(c) 250 *ml*

15. If the cost of one litre of kerosene oil is Rs 32, what will be the cost of the following amounts of kerosene oil:

    (a) 2 *l*

    (b) 250 *ml*

    (c) 500 *ml*

16. Round off the following to the nearest litre:

    (a) 487 litres and 700 millilitres→_____ litres

    (b) 289 litres and 250 millilitres→_____ litres

    (c) 897 litres and 500 millilitres→_____ litres

Addition and subtraction of litres and millilitres

Many situations require the addition of litres or millilitres e.g. when a dairy collects milk from many vendors and wants to know if it has enough for its daily sale. Other situations require subtraction of litres or millilitres e.g. If a shopkeeper had a certain amount of milk and sold some of it and he wants to know how much is left to decide whether he has enough to meet his customers' demands.

Litres can be added to litres, subtracted from litres, or multiplied by a number just like numbers, but the sum, difference, or product is in litres. Similarly, millilitres can be added to millilitres and subtracted from millilitres.

If the measurement involves both litres and millilitres, then we add millilitres to millilitres and litres to litres.

If the number of millilitres in the sum is equal to 1000 or more than 1000, we convert it to litres and millilitres by taking the 3 digits from the right as millilitres and the remaining ones as litres.

Then add the litres to the sum or product in litres.

For example, we write 1700 millilitres as 1 litre and 700 millilitres, 1750 as 1 litre and 750 millilitres.

Example1

  3 *l* and 500 *ml*
+2 *l* and 300 *ml*
---
  5 *l* and 800 *ml*

Example2

  4 *l* and 700 *ml*
+3 *l* and 500 *ml*
---
  7 *l* and 1200 *ml*
=8 *l* + 1 *l* + 200 *ml*
=9 *l* 200 *ml*

Similarly, we subtract *ml* from *ml* and *l* from *l*. If the no of *ml* to be subtracted is more, then we take away 1 litre from *l*, rename it as 1000 *ml*,

and add that to *ml* and then subtract the *ml* from *ml*.

Example 3

4 *l* and 500 *ml*
- 1 *l* and 200 *ml*
---
3 *l* and 300 *ml*

Example 4

4 *l* and 400 *ml*
-2 *l* and 750 *ml*

As the number of ml to be subtracted 750 is more than 400, we write 4 *l* and 400 *ml* as 3 *l* + (1000 + 400 = 1400) *ml*. Subtracting *ml* from *ml* we have 1400 – 750 = 650 ml and *l* from *l* we have 3 – 2 = 1 *l* which we write below the line

3 *l* and 1400 *ml*
-2 *l* and 750 *ml*
---
1 *l* and 650 *ml*

Example 5

A ration depot had 400 *l* of kerosene oil, it sold off 135 *l* on a particular day. How much kerosene oil does it have now?

400 *l*
–135 *l*
---.
265 *l*

Example 6

A sweetshop owner bought 15 *l* and 500 *ml* of milk. He used up 8 *l* and 800 *ml* of milk to make sweets. How much milk is left with him?

15 *l* and 500 *ml* = 14 *l* and 1500 *ml*

14 *l* and 1500 *ml*

– 8 *l* and 800 *ml*

6*l* and 700 *ml*

Exercise 11.2

1. Convert the following to *l*
   (a) 5000 *ml* = _____*l*
   (b) 1500 *ml* = _____*l* _____*ml*
   (c) 4050 *ml* = _____*l* _____*ml*
2. Convert the following to ml:
   (a) 1 *l* = _____*ml*
   (b) 5 *l* = _____*ml*
   (c) 1 *l* and 500 *ml* = _____*ml*
   (d) 3 *l* and 200 *ml* = _____*ml*
3. Round off the following to the nearest litre:
   (a) 487 *l* and 700 *ml*→_____ *l*
   (b) 289 *l* and 250 *ml*→_____ *l*
   (c) 897 *l* and 500 *ml*→_____ *l*
4. Add the following:
   (a) 855 *l* + 377 *l* (b) 288 *l* and 500*ml* + 475 *l* and 700 *ml*
5. Subtract the following:
   (a) 890 *l*–377 *l* (b) 700 *l* and 200 *ml*–285 *l* and 450 *ml*
6. How can you measure the following amount of milk if you have standard containers of 1 litre and 2 litre capacities?
   (a) 3 *l*
   (b) 5 *l*
7. Two buckets have a capacity of 16 *l* and 500 *ml* and 14 *l* and 500 *ml*. How much water can be stored in those?
8. A lady bought 2 *l* and 500 *ml* of milk. If she used up 1 *l* and 200 *ml* of milk for breakfast. How much milk is left with her?
9. A petrol pump had 800 *l* of petrol. Another petrol pump had 432 *l* of petrol. How much more petrol does the first petrol pump have compared to the second?
10. A dairy bought 23 *l* from one milk vendor, 17 *l* from another milk vendor.
    (a) How much milk did it buy in all?
    (b) After it sold off 15 *l*, how much milk is left with it?

UNIT 12

Time

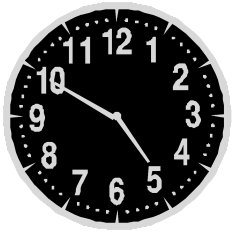
Units of time

The time it takes the earth to rotate about its axis once is a **day**.
The time it takes the earth to revolve around the sun once is called a **year**.
The time is measured in years, days, hours, minutes, and seconds.
1 year = 365 or 366 days.
It takes the earth $365\frac{1}{4}$ days to revolve around the sun. so, every fourth year, we have 366 days to account for an additional one-fourth of the day.
The year with 366 days is called a **leap year**.
1 day = 24 hours
1 hour = 60 minutes
1 minute = 60 seconds.
The years are counted from the birth of Christ and referred to as AD and years before the birth of Christ as BC.

Reading time on a clock

Show the video: https://youtu.be/Bqo6-DMzdB8?t=412
We measure hours, minutes, and seconds by the movement of the hands of a clock.
We read time by looking at the second hand, minute hand, and hour hand of a clock.
As many clocks do not have a second hand and the number of seconds is not important for most of the activities in daily life we will not consider them in this class.
The teacher can show a clock and show the hour hand and minute hand in the clock, the direction in which the hands move by drawing an arrow.
Name the direction in which the hands move?
Name the direction opposite to which hands of a clock move?

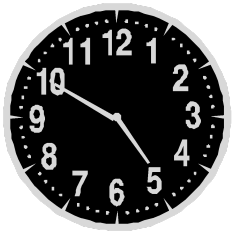
The time it takes the minute hand to move from one dot to the next dot is one minute and to move from one number to the next is 5 minutes.
It takes 60 minutes for a minute hand to complete a full circle.
It takes the hour hand 1 hour or 60 minutes to move from one number to the next.
When the minute hand points to 12 and the hour hand points to a number say 5, the time is 5 o'clock.
If the minute hand points to 6 and the hour hand points to a number between two numbers say 3 and 4, the time is half-past 3.
In the clock given below, the hour hand is between 4 and 5. As the minute hand points to 10, we multiply 10 and 5 to find the number of minutes that have passed after 4. As that is 50 minutes, the time is 50 minutes past 4. We write it as 4:50.
As it will take the minute hand 10 minutes to go to 5, we can also say the time is 10 minutes to 5.



As there are 30 minutes in an hour and half of that is 30 minutes. Half past 3 is the same as 3:30.
In the clock given below the minute hand is on 3 and the hour hand is past 9. Therefore, the time is $3 \times 5 = 15$ minutes past 9 or 9:15.
As there are 60 minutes in an hour, 15 minutes is one-fourth or quarter of that, we can also express 9:15 as quarter past 9.

We can also express the time in terms of minutes it will take for the hour hand to go to a specific number. For example, if the time is 4:45, as it will

take 15 minutes for the hour hand to go to 5 o'clock, we can also say time is 15 minutes to 5. We usually do that if the time is less than 30 minutes.
As 15 minutes is one-fourth or quarter of that, we can also express 4:45 as quarter to 5.
Read the time on the clocks given below:



If the minute hand points to a dot between two numerals, then multiply the numeral that minute hand has passed by 5 and add to it the number of dots after the numeral to which minute hand points. The time on the clocks given below is 9:34.

Use of a.m. (ante meridian) or p.m. (post meridian)
As the clock shows only 12 hours and a day has 24 hours, the clock shows the same time twice during the day. To distinguish between them, we write a.m. or p.m. after the time.
The time from 12 midnight to 12 noon is denoted as a.m. and the time from 12 noon to 12 midnight as p.m.
We write p.m. for 12 o’clock at noon and a.m. for 12 o’clock at midnight.
The time shown on the clocks is given below them.

7:20

6 o’clock

4:40

10:12

9:15 or quarter past 9

7:14

Setting the time on a clock

We often need to set a clock to a specific time as your clock might have stopped or become slow due to a weak battery. After inserting a new battery, we set it by first moving the hour hand and then the minute hand to the specified minutes.

Suppose we want to set it to 7:40, move or set the hour hand to 7 and then move the minute hand to 8(40÷5).

Similarly to set it to 4:34, move or set the hour hand to 4, and then move the minute hand to 4 dots past 6 to show 34 minutes(6 ×5 + 4).

Use of a.m. (ante meridian) or p.m. (post meridian)

The clock shows the same time twice during the day. We write a.m. or p.m. after the time. The time from 12 midnight to 12 noon is noted as a.m. and the time from 12 noon to 12 midnight as p.m.

Exercise 12.1

1. Read the time shown on the clocks given below:

(a)

(b)

(c)

(d)

(e)

(f)

2. Write the following times in words:
   (a) 4:10 (b) 5:30 (c) 8:45 (d) 9:15
3. If you want to set the times given below, tell where would you set (i) the hour hand and (ii) the minute hand:
   (a) 4 o'clock (b) 5:30 (c) 8:45 (d) 4:32
4. Set the following times on a clock at home and have someone check it.
   (a) 7 o'clock (b) 5:30 (c) 8:45 (d) 4:32
   (e) 5:15 (f) 7:13 (g) 12 o'clock
5. What would be the time half an hour after the times given below:
   (a) 4 o'clock (b) 6:30 (c) 3:15 (d) 10:43
6. What would be the time 15 minutes before the times given below:
   (a) 10 o'clock (b) 2:30 (c) 9:45 (d) 6:52
7. What would you use a.m. or p.m. for the following times:
   (a) I get up at 6:00
   (b) I go to school at 7:15
   (c) I have my lunch at 1:10
   (d) Our school closes at 12:30

8. What would you use-a.m. or p.m. to write the following times:
   (a) 7 in the morning
   (b) 4 in the evening
   (c) 9 at night
   (d) 10 in the morning

Duration of time

Show the video: https://youtu.be/ML6r7BEZo7M?t=7

We often need to find the duration of an event starting and finishing at particular times. We can think of these times on a clock and count the hours and minutes the clock would have taken to move from one time to the other.

If the hour of start and finish of the event is the same, we count the minutes by subtraction.

If the hour of start and finish of the event is different, then we can find the minutes to the next hour, then find the hours from that to the hour of the time the event finishes, and then the minutes past that and add all of them. If the minutes are more than 60, we convert those to hours and minutes.

Example 1

The first period begins at 7:10 a.m. and ends at 7:50 a.m. How long is the duration of the period?

It will take the clock 40 minutes to move from 7:10 a.m. to 7:50 a.m., therefore, the duration of the period is 40 minutes.

Example 2

A movie starts at 12.30 p.m. and ends at 3:15 p. m., what was the duration of the movie?

Time from 12:30 p.m. to 1:00 p.m. = 30 minutes

Time from 1:00 p.m. to 3:00 p.m. = 2 hours

Time from 3:00 p.m. to 3:15 p.m. = 15 minutes

The total duration of the movie = 2 hours 45 minutes.

Example 3

A train starts at 2.15 p.m. from Delhi and reaches Ambala at 5:30 p.m., how long does it take to perform the journey?

Time from 2:15 p.m. to 3:00 p.m. = 45 minutes

Time from 3:00 p.m. to 5:00 p.m. = 2 hours

Time from 5:00 p.m. to 5:30 p.m. = 30 minutes

Total duration of the movie = 2 hours 75 minutes

= 2 hours + 1 hour 15 minutes

= 3 hours 15 minutes.

Sometimes we know the starting time and the duration of the event and want the finishing time of the event. Then we add the hours and minutes to the time the event started to find out at what time the event would finish.

Example 4

The journey from Delhi to Saharanpur takes 4 hours and 30 minutes. A train that started from Delhi at 3:40 p.m. at what time the train will reach Saharanpur?

4 hours after 3:40 p.m. is 7:40 p.m.

30 minutes after 7:40 p.m. is 8:10 p.m.

Therefore, the train would reach Saharanpur at 8:10 p.m.

Date

The time of a particular event e.g. birth, death is specified by the day, month, and year and is called the date.

The day Jesus Christ the founder of the Christian religion was born is taken as the year zero in the present numbering of years. The years before that are counted as so many years before Christ.

A **date** is specified by a day, month, and year. We write a date as 7th April 2004 or April 7, 2004, or 7.4.2004.

Months

A year is divided into 12 months.

There are 12 months in a year.

The name of months in a year and days in different months are as follows:

January is the first month of the year and has 31 days.

February is the second month of the year and has 29 days in a leap year and 28 days in other years.

March is the third month of the year and has 31 days.

April is the fourth month of the year and has 30 days.

May is the fifth month of the year and has 31 days.

June is the sixth month of the year and has 30 days.

July is the seventh month of the year and has 31 days.

August is the eighth month of the year and has 31 days.

September is the ninth month of the year and has 30 days.

October is the tenth month of the year and has 31 days.

November is the eleventh month of the year and has 30 days.

December is the twelfth month of the year and has 31 days.

Each month begins with day 1 and the days increase by one till the number of days the month has.
A year begins with the first day of January and the other months follow in order until the thirty-first of December.
After December, January of next year comes and the other months follow in order.
Learning the poem given below will help you in remembering days in different months.

Poem

Thirty days has September,
April, June, and November.
All the rest have thirty-one,
Except for February alone,
which has twenty-eight days clear
and twenty-nine in each leap year.

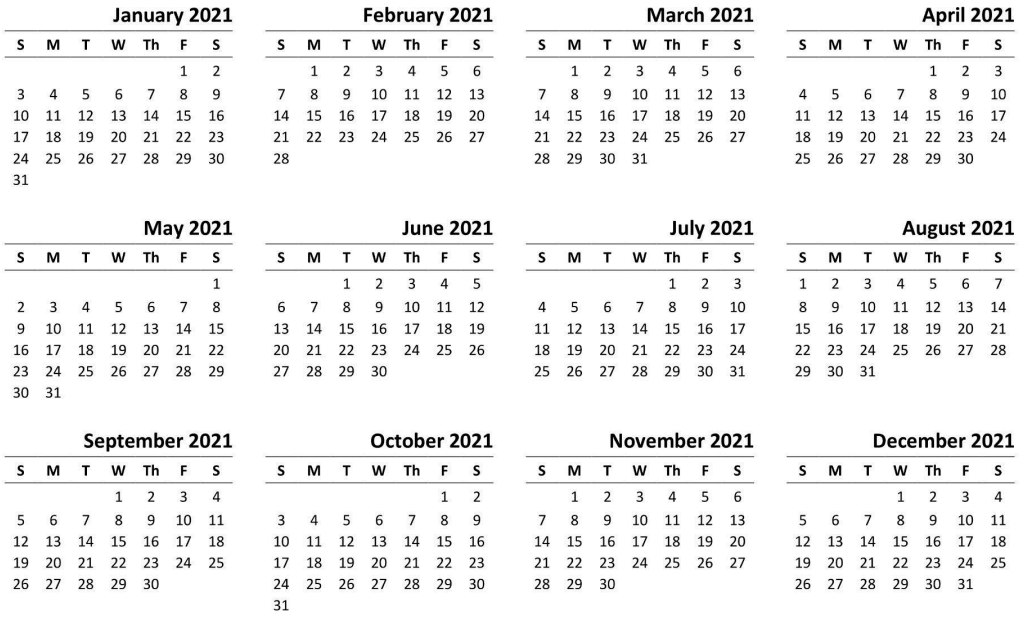
Calendar

A calendar shows months of a year and days in a month and names of days of the week on different days.
A year has 52 weeks and a week has 7 days.
The names of the days in a week in order are **Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday.**
These are followed again by these days in the next week.
Monday is taken as the first day of the week.
A calendar is helpful in finding the days of the week on which a particular day would fall or the date on which a particular day, say first Sunday or second Saturday would fall.
Can you suggest some situations in which you would want to know these?

Duration of events

Some events last for days or days and months, a calendar is helpful in finding the intervals between specified dates. A calendar for the year 2021 is given below.

Calendar-2021



January 2021

S	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

February 2021

S	M	T	W	Th	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

March 2021

S	M	T	W	Th	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

April 2021

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

May 2021

S	M	T	W	Th	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

June 2021

S	M	T	W	Th	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

July 2021

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

August 2021

S	M	T	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

September 2021

S	M	T	W	Th	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

October 2021

S	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

November 2021

S	M	T	W	Th	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

December 2021

S	M	T	W	Th	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

It gives the name of months and days in each month and name of the days on which different days fall.

Use of calendar for finding durations of events.

If the month is the same, we find the duration of the event by counting the days of the event from the calendar.

Example 1

Dussehra holidays start on 5th October and end on 16th October. How long are the Dussehra holidays? We can either count up to 16 beginning with 5 or find the days in October that are not holidays and subtract them from 16.

Days before October 16 that are not holidays – 4

Length of Dussehra holidays = 16 – 4 = 12 days.

If the month of start and finish is different, we find the duration of the event by finding days in the month of the event as explained above to days in next months and the days in the month the event finished.

Example 2

Gaurav went on leave on 16th May and came back to work on 3rd July, How long was his leave?

Number of days in May he was not on leave = 15 days

Number of days he was on leave in May = 31 – 15 =16 days

Number of days he was on leave in June = 30 days

Number of days he was on leave in July = 2 days

Total number of days he was on leave = 16 + 30 + 2 = 48 days.

Example 3

A mela was to be held for 10 days, if it started on December 5, what would be its last day?

Counting 10 days beginning with 5, we get to 14 December. Therefore, the last day of Mela would be 14th December.

Exercise 12.2

1. What would be the time 40 minutes after the following times:
   (a) 5:00 a.m.
   (b) 4:40 p.m.
   (c) 9:15 p.m.
   (d) 12 p.m.
2. What would be the time 30 minutes before the following times:
   (a) 6:00 a.m.
   (b) 12:10 a.m.
   (c) 9:15 p.m.
   (d) 12 p.m.
3. A TV programme begins at 4:05 and ends at 4:32, what is the duration of the programme?
4. A shop opens at 10:00 a.m. and closes at 7:30 p.m. For how many hours is the shop open?
5. A Tennis match began at 9:15 a.m. and ended at 10:35 a.m., what is the duration of the match.
6. A play is 2 hours 15 minutes long, if it began at 6:00 p.m., at what time would it end?
7. Give examples of situations where you need to find intervals in hours and minutes.
8. How many days are there in a week? Name the days of the week in order.
9. How many months are there in a year? Name the months of a year in order.
10. How many days are there in the following months?
    (a) January
    (b) May
    (c) June
11. Read the following dates:
    (a) 3.9.2002 (b) 4.1. 1999 (c) 4^{th} July, 2005
13. Write the date today in two ways.
14. Which day of the month is the second Saturday of January in 2021
15. Our independence day is on 15^{th} August, name the day of the week on which it would fall this year from the calendar.

16. When is your birthday? Name the day of the week on which would it fall this year?
17. Where do you find dates written in your surroundings?
18. Ravindra worked from December 4 to December 11 in an Exhibition, how many days did he work?
19. Anita stayed from May 17 to June 10 in Bombay, how many days did she stay in Bombay?
20. The schools close for Christmas vacation for 10 days. If the vacation started on December 24, when will the schools reopen?
21. Give examples of situations where you need to find duration in days.

UNIT 13

Organization, Display, and Interpretation of data

Show the video: https://youtu.be/-W_cnD4yZWU?t=1267
Teachers can show parts of the video relating to the lesson on the day.

Collection and tallying of real-world data

Ask students about healthy foods
Then select one healthy food depending on the season and write on the blackboard.
I like cauliflower
I do not like cauliflower.
Then ask students, one at a time to describe how they feel about eating that food e.g. cauliflower and mark a tally in the correct row.
When all the students have given their opinion, call on a volunteer to count the number of tallies in each row and record the number at the end of the row.
It would make the counting easier if we record the fifth entry by making a straight or diagonal mark across the first four lines (𝍸). Call on a volunteer to redraw the tallies using the grouping notation and then ask

1. Did it make it easier to count the tallies in the tally graph?
2. Why did that notation make it easier?
3. Can you name the categories for which we collected data for the chart?
4. How did we show what we found out?

Pictographs

A pictograph is a graph that uses pictures to give information**.**
The pictograph given below shows children in a class born in different months (or the teacher can make it for the class by listing the months and asking children to come one by one and draw a smiley face against the month in which they were born):

January	☺ ☺ ☺
February	☺ ☺ ☺ ☺ ☺ ☺
March	☺ ☺ ☺ ☺ ☺
April	☺ ☺ ☺
May	☺ ☺
June	☺ ☺ ☺ ☺
July	☺ ☺ ☺ ☺
August	☺
September	☺ ☺ ☺
October	☺ ☺ ☺ ☺
November	☺ ☺
December	☺ ☺

Key- ☺ = 1 student

We can find the following type of information from this chart:

1. The number of children born in different months by counting the numbers of smiley faces against that month, e.g. 3 children were born in January, 4 children were born in October.
2. The name of the month with the largest numbers of smiley faces is the month in which the maximum number of children were born.
3. The name of the month with the smallest number of smiley faces is the month in which the minimum number of children were born.
4. The total of smiley faces in all the rows gives the number of children in the class.

The pictograph given below shows the snacks students like most of the four snacks listed for a class of students.

Snacks Students of Class IV Like

Samosa	☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺
Potato Chops	☺ ☺ ☺ ☺ ☺ ☺
Bread Pakora	☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺
Cake	☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺
Others	☺ ☺ ☺

☺ = 1 students

Ask students,

1. How many children like Samosa the most?
2. How many children like cake the most?
3. Which is the most popular snack?
4. Which is the least popular snack?
5. In the above pictograph, each face represented one student.

If the number of objects is large, a face can be used to represent 2 or more objects.

We write it at the bottom of the pictograph and it is called a **key**.

If eight children choose a snack, we show it with 4 smiley faces.

How would you show that eleven people chose that snack?

The chart given below presents the same information with a face here representing two objects.

Snacks Students of Class IV Like

Samosas	☺ ☺ ☺ ☺ ☺ ☺ ☺
Potato chops	☺ ☺ ☺
Bread Pakora	☺ ☺ ☺ ☺ ☺ ☺
Cake	☺ ☺ ☺ ☺
Other snacks	☺ ☺

☺ = 2 students

We can find the information from this chart in a similar manner, counting by 2 the number of smiley faces e.g.

1. Number of children who like a snack the most by counting the number of smiley faces against that snack by 2
2. The snack with the largest number of smiley faces is the snack which is most popular.
3. The snack with the smallest number of smiley faces is the snack that is least popular.
4. The number of children in the class can be found by counting all the smiley faces by 2.

Bar Graph

Representation of data by a pictograph is time-consuming.

Another visual presentation of data in a table is by a **Bar graph**.
To create a bar graph,

1. Draw a horizontal line and a vertical line beginning at the start of the horizontal line.
2. Write the name of categories along the horizontal line and choose a scale for the length of the bar along the vertical scale.
3. Erect bars of uniform width vertically for each category with length equal to the number in a category. The bars should have equal spacing between them.
4. Write the name of the variable below the name of the categories.
5. Write the number of objects or persons along the vertical line.
6. Write the title on the top of the Bar Graph.

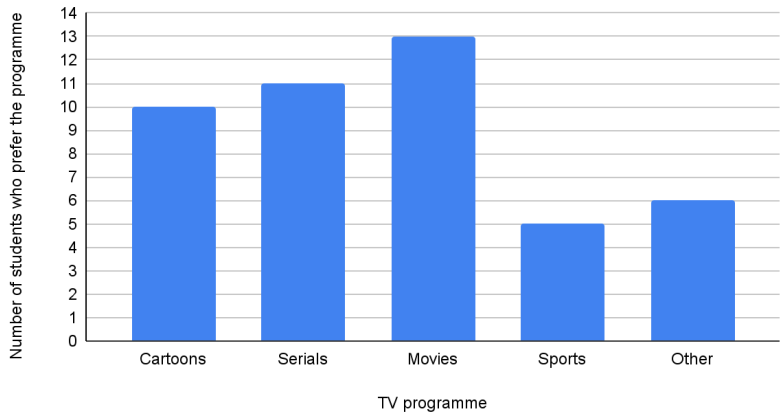
Example 1

Favourite TV Programme of Students of Class 4

Name of the TV Programme	Number of students who favour it
Cartoons	10
Movies	13
Serials	8
Sports	5
Other	6

A bar graph of the data on favourite TV programmes for a class given in the table is given below:

Favourite TV Programme of Students of Class 4

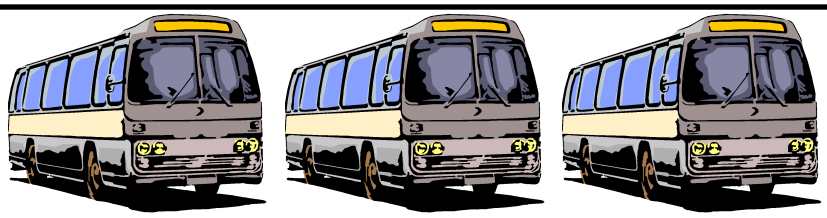


A Bar Graph enables us to answer questions like the ones given below:

1. How many children prefer to watch cartoons? -10
2. How many children prefer to watch sports? - 5
3. Which kind of programme is most popular? - Movies
4. Which kind of programme is least popular? - Sports
5. How many more children prefer to watch movies than serials? - 2
6. Do the table and bar graph provide the same information? - Yes

Exercise 13

1. A child collected the leaves that had fallen on a day in his garden. The pictures of leaves are given in Activity Sheet 1 . Cut these and make a pictograph of leaves with different shapes. You can copy or draw the shapes.
   (a) How many leaves of different shapes are there?
   (b) How many leaves of shape are there?
   (c) How many leaves of shape are there?
   (d) What shape is most frequent?
   (e) What shape is least frequent?
2. The number of different vehicles passing a pole in a busy street at a point in 5 minutes is shown in the pictograph given below:

Cars	
Buses	
Auto Rickshaws	
Bicycles	

Key-A picture stands for 5 vehicles

   (a) How many auto-rickshaws passed the point?
   (b) How many buses passed the point?

(c) Among the vehicles passing the point, which vehicle is most common?

(d) Among the vehicles passing the point, which vehicle is least common?

(e) What are the advantages of representing many vehicles by one vehicle in the pictograph?

(f) What are the disadvantages of representing many vehicles by a vehicle in the pictograph?

3. The students of a class collected data on their favourite hobby and organized it into the table given below.

Favourite Hobby of Class IV Students

Hobby	Singing	Watching TV	Playing	Reading	Others
Number of students	8	10	6	4	6

(a) Make a pictograph of the above data where a smiley face represents 1 child.

(b) Make a pictograph of the above data where a smiley face represents 2 children

Project

The teacher may pass on small slips of paper, preferably cards to the whole class to give their responses to each of the questions such as how many siblings do you have, which month were you born, the score of students on the last quiz in mathematics. Ask them to write the answers to each of these on a separate paper and collect answers to each question one at a time.

The teacher may then form groups of three to four children and pass to each group data collected from all the students in the class on one question.

Ask each group to do the following:

1. Record the data in a table.
2. Write a heading for the table.
3. Write labels for all the rows and columns.
4. Mark tallies for each row beginning with the second row depending on the number of students who chose the item given in that row.

5. Make a bar graph of the above data.
6. Present the findings to the class.
7. Make a pictograph with a picture representing 1 or more objects or persons
8. Do the table, pictograph, and bar graph provide the same information?
9. Which representation of data would you prefer and why?

UNIT 14

Patterns

Patterns in multiples of 9

$1 \times 9 = 9$ (9)

$2 \times 9 = 18$ (1 + 8 = 9)

$3 \times 9 = 27$ (2 + 7 = 9)

$4 \times 9 = 36$ (3 + 6 = 9)

$11 \times 9 = 99$ (9 + 9 = 18 = 1 + 8 = 9)

$25 \times 9 = 225$(2 +2 + 5 = 9)

…….

Patterns can be helpful in solving problems.

The number pattern for multiples of 9 helps us to check whether a number is divisible by 9 or not.

A number is divisible by 9 if the sum of its digits(reduced to a single digit if it is more by adding the digits)is 9.

For example, the sum of digits of 297 = 2 + 9 + 7 = 18 = 1 + 8 = 9, therefore the number is divisible by 9. Verify it.

Which of the following numbers are divisible by 9:

(a) 63 (b) 78 (c) 453 (d) 837 (e) 567

Patterns in the sums of consecutive odd numbers beginning with 1.

$1 + 3 = 4$ (2×2)

$1 + 3 + 5 = 9$ (3×3)

$1 + 3 + 5 + 7 = 16$ (4×4)

$1 + 3 + 5 + 7 + 9 = 25$ (5×5)

What pattern do you notice?

Use the pattern to find the sum of the following odd numbers:

1 + 3 + 5 + 7 + 9 + 11

1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17

Multiplying and dividing by 10 and 100

$4 \times 10 = 40$

$5 \times 10 = 50$

$8 \times 10 = 80$

$30 \times 10 = 300$
$25 \times 10 = 250$
What pattern do you notice in multiplication of a number by 10?
Would the pattern hold for any multiple of 10?
$7 \times 100 = 700$
$5 \times 100 = 500$
$8 \times 100 = 800$
$30 \times 100 = 3{,}000$
$25 \times 100 = 2500$
What pattern do you notice in multiplication of a number by 100?
Would the pattern hold for any multiple of 100?
$50 \div 10 = 5$
$70 \div 10 = 7$
$90 \div 10 = 9$
$570 \div 10 = 57$
$600 \div 10 = 60$
What pattern do you notice in the division of a multiple of 10 by 10?
$50 \div 10 = 5$
$70 \div 10 = 7$
$90 \div 10 = 9$
$570 \div 10 = 57$
$600 \div 10 = 60$
Would the pattern hold for any multiple of 10?
$600 \div 100 = 6$
$500 \div 100 = 5$
$900 \div 100 = 9$
$5700 \div 100 = 57$
$4000 \div 100 = 40$
What pattern do you notice in the division of a multiple of 100 by 100?
Would the pattern hold for any multiple of 100?

ANSWERS TO SELECTED EXERCISES

Exercise 1.1

3. (a) 743 (b) 608 (c) 4,000 (d) 3,757 (e) 8,364
   (f)2,406 (g) 9,009 (h) 7,085 (i) 3,001 (j) 1,708
4. (a) Sixty seven
   (b) Eight
   (c) Seven hundred two
   (d) Two thousand eight hundred ninety four
   (e) Nine thousand seven hundred four
   (f) Six thousand nine
   (g) Eight thousand fifty six
   (h) One thousand eight hundred ninety
   (i) Seven thousand fifty two
   (j) Four thousand five
5. (a) 1,006 (b) 6,735 (c) 10,000 (d) 2,010 (e) 1,000
6. (a) 499 (b) 4,686 (c) 1,999 (d) 3,259 (e) 4,499
7. (a) 4,327 (b) 8,705 (c) 3,040 (d) 9,506 (e) 2,690
8. (a) 6,952 = 6 Thousands + 9 hundreds + 5 tens + 2 ones
   (b) 8,478 = 8 Thousands + 4 hundreds + 7 tens + 8 ones
   (c) 5,089 = 5 Thousands + 0 hundreds + 8 tens + 9 ones
   (d) 6,703 = 6 Thousands + 7 hundreds + 0 tens + 3 ones
   (e) 4,002 = 4 Thousands + 0 hundreds + 0 tens + 2 ones
9. (a) 548 (b) 7,634 (c) 8,043 (d) 9,008
10. (a) 0 (b) 6 (c) 4 (d) 7
11. (a) 80 (b) 4 (c) 2,000 (d) 400 (e) 8,000
    (f) 0 (g) 1000 (h) 800 (i) 3000 (j) 0
12. (a) 710 (b) 8,078

Exercise 1.2

3. (a) 25,467 (b) 43,695 (c) 60,247 (d) 33075
   (e) 58,405 (f) 80,007 (g) 90,000
4. (a) Seventy eight thousand five hundred eighty three
   (b) Fourteen thousand eight hundred fifty one
   (c) Sixty seven thousand nine hundred eight
   (d) Fifty four thousand sixty four

(e) Forty eight thousand seven
(f) Thirty thousand
(g) Seventy thousand five
(h) Twenty four thousand six
(i) Fourteen thousand seventy eight
(j) Fifty thousand seven hundred eighty six

5. (a) 24,001 (b) 56,720 (c) 43,500
(d) 65,000 (e) 40,000 (f) 56,848

6. (a) 99 (b) 45,674 (c) 78,779
(d) 66,799 (e) 33,999 (f) 49,999

7. (a) 8 (b) 8 (c) 6 (d) 4 (e) 7

8. (a) 800 (b) 9,000 (c) 3 (d) 0 (e) 300
(f) 90,000 (g) 10,000 (h) 40 (i) 800

Exercise 1.3

1. (a) > (b) > (c) < (d) > (e) <

2. (a) 25, 30, 67 (b) 462, 760, 873 (c) 546, 4,906, 8,531
(d) 4,785, 4,794, 34,762

3. (a) 78, 58, 23 (b) 782, 567, 349 (c) 45,982 25,873 9,432
(d) 85,964 85,329 67,413

4. 1,000 5. 99,999 6. 239 7.8,542

8. 249, 294, 429, 492, 924, 942 9. 510, 501, 150, 105, 51, 15

Exercise 2.1

1. 1,5 1,0

2. (a) 123 (b) 2,835 (c) 34
56 475 659
7 56 2,432
----- -------- ---------
----- -------- ---------

3. (a) 7,979 (b) 8,701 (c) 8,042
(d) 8,115 (e) 7933 (f) 7,334
(g) 3,909 (h) 8,311 (i) 15,340
(j) 8,900 (k) 8789

Exercise 2.2

1. (a) 54 (b) 106 (c) 604 (d) 502 (e) 255 (f) 105

3. (a) 6,134 (b) 5,185 (c) 888 (d) 1,517
   (e) 1794 (f) 2,372 (g) 1,304 (h) 1,558
   (i) 2,258 (j) 3,152 (k) 3,849 (l) 1,659

Exercise 2.3

1. (a) 40 (b) 40 (c) 370 (d) 550
2. (a) 200 (b) 600 (c) 700 (d) 1,400
   (e)73,000
3. (a) 3,000 (b) 4,000 (c) 3,000 (d) 41,000
   (e) 73,000
4. (a) 110 (b) 70 (c) 30
5. (a) 500 (b) 600 (c) 500
6. (a) 12,000 (b)14,000 (c) 3,000 (d) 8,000

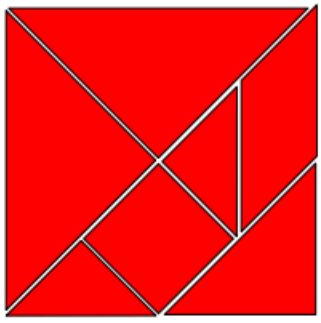
Exercise 2.4

1. (a) 3 (b) 63 (c) 23 (d) 105 (e) 33
2. (a) 10 - (2 + 4) (b) 50 – (12 + 16) (c) (45 – 22) + 4
   (d)(100 –37) – 10 (e) 500 – (67 + 42)
3. (a) 150-(120 + 15) (b) 15
4. (a) 1234 – 75 + 135 (b) 1294
5. (a) 40 – 5 + 7 (b) 42

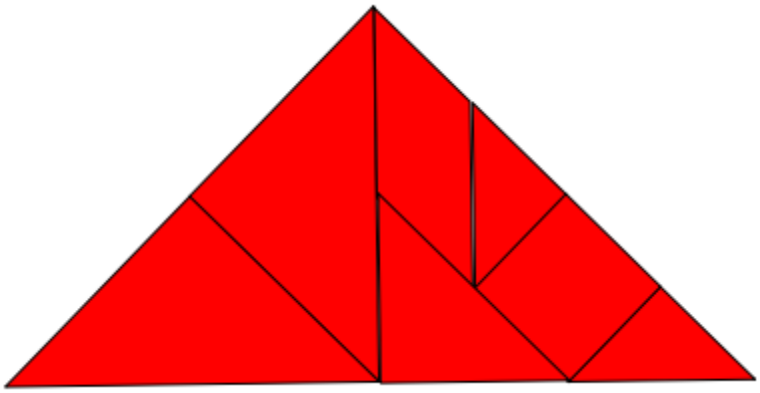
Activity 3.3

Geometrical shapes made with all the seven pieces

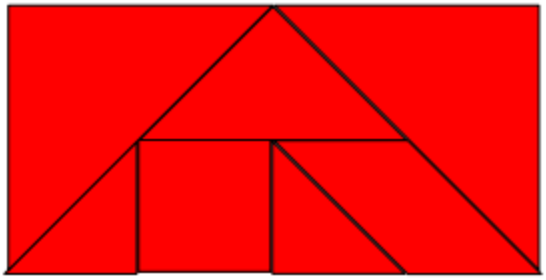
Square



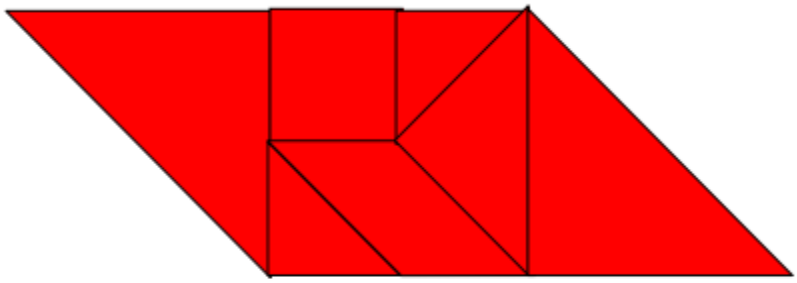
Triangle



Rectangle



Parallelogram



Animals

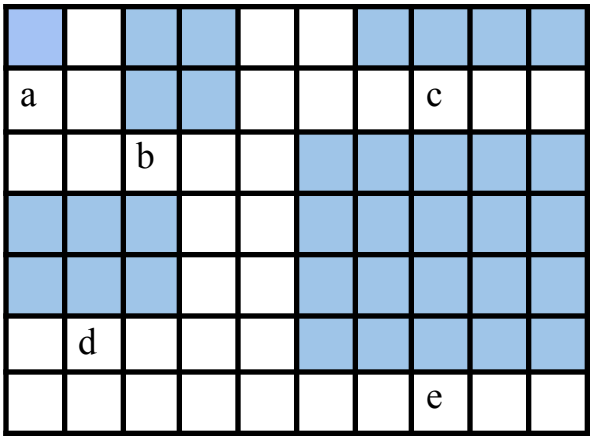
People

Exercise 3.2

1. (a) 500 m (b)1000 m
2. 5 m 3. 1400 m
4. (a) 8 (b) 10 (c) 16 (d) 12
5. (a) 16 (b) 12
8. (a) 12 (b) 16 (c) 5 (d) 4 (e) 20
9. 12 m^2 10. (a) 500 m (b) 1500 m

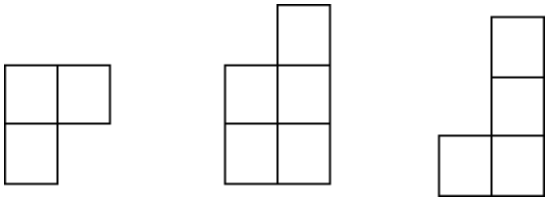
Exercise 3.3

5.

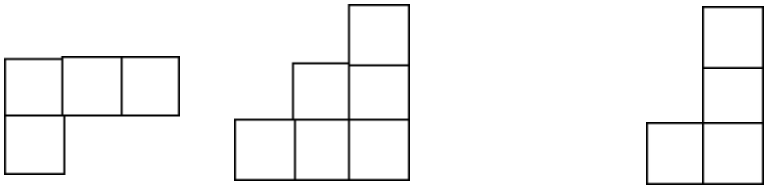


Exercise 3.4

4(a) Top Front Right side



(b) Top Front Right side



(c) Top Front Right side

Exercise 4.1

3. (a) 7 (b) 6 (c) 2 (d) 21 (e) 6
   (f) 4 (g) 6 (h) 7
4. (a) 30 (b) 270 (c) 1,800 (d) 1,240 (e) 3,780 (f) 54,820
5. (a) 90 (b) 250 (c) 480 (d) 480 (e) 630 (f) 280
6. (a) 400 (b) 6,300 (e) 4,900
7. (a) 86 (b) 66 (c) 96 (d) 310 (e) 184 (f) 644
   (g) 224 (h) 666 (i) 486 (j) 396 (k) 2,706 (l) 5,384
   (m) 2,159 (n) 6,804 (0) 4,125 (p) 5,931

Exercise 4.2

1. (a) 120 (b) 240 (c) 2,443 (d) 3,624
   (e) 7,020 (f) 1,852 (g) 5,024
2. (a) 192 (b) 1,288 (c) 2,700 (d) 1,666
   (e) 4,810 (f) 6,230 (g) 4,350 (h) 1,541
   (i) 7,216 (j) 2,520 (k) 3,680 (l) 5,952
3. (a) 3,962 (b) 14,014 (c) 37,012 (d) 41,952
   (e) 41,797 (f) 28,008 (g) 72,842 (h) 16,910
   (i) 31,020 (j) 65,189 (k) 74,292 (l) 37,500
4. (a) 98,362 (b) 3,69,102 (c) 2,96,175 (d) 1,52,532
   (e) 2,13,525 (f) 3,98,912 (g) 3,07,330 (h) 3,23,952
   (i) 1,31,700 (j) 1,81,442 (k) 1,20,681 (l) 5,17,408

Exercise 4.3

1. 48 2. 210 3. 120 4. 2,250 5. 5,750
6. 6,040 7. 720 8. 364 9.30

Exercise 5

5. (a) even (b) 2, 4, 6, 8, 0 (c) yes (d) odd
   (e) 1, 3, 5, 7, 9 (f) yes (g) yes (h) yes

6. 6, 20, 64 7. 1, 63, 57, 91 8. yes 9. yes
10. No, 4 + 3 =7 11. 30 and 60
12. (a) no (b) yes (c) yes
13. $2 \times 3 \times 4$, $1 \times 6 \times 4$, $1 \times 12 \times 2$, $1 \times 8 \times 3$
14. (a) 0 or 5 (b) multiples (c) factors
15. 70, 25 16. 24, 48, 96
17. (a) 1, 2, 3, 4, 6, 12 (b) 1, 2, 5, 10 (c) 1, 2, 3, 4, 6, 8, 12, 24
(d) 1, 17
18. no 19. no, 3 is a factor of 9 but its multiple 6 is not a factor of 9
20. yes
21. (a) 40, 12, 2, 30 because they are all even.
(b) 40, 25, 5, 30 because they end in 0 or 5
(c) 40 because $8 \times 5 = 40$
(d) 40 and 30 as these are multiple of 10.
22. (a) 23, 25, 5 as these are odd numbers.
(b) 23, 12, 2 as the digit in ones place is not 0 or 5.
(c) 23, 25, 12, 5, 2, 30 as these are not multiples of 8.
(d) 23, 25, 12, 5, 2 as the digit in ones place is not 0.

Exercise 6.1

1. (a) $15 \div 5 = 3$ (b) $6 \div 3 = 2$ 3. $25 \div 5 = 5$ (d) $12 \div 4 = 3$
(e) $10 \div 2 = 5$

Exercise 6.2

3. (a) 3 (b) all (c) 0
4. (a) 5 (b) 20 (c) 1
5. (a) 5 (b) 25 (c) 2
6. (a) 1 (b) 3 (c) 1 (d) 15
(e) 5 (f) 15 (g) 0 (h) Rs. 15
7. (a) 0 (b) 0 (c) 2 (d) 27
(e) 5 (f) 25 (g) 2 (h) Rs. 5
8. (a) 1 (b) 6 (c) 0 (d) 9
(e) 1 (f) 6 (g) 6 (h) Rs.11
9. (a) 0 (b) 0 (c) 2 (d) 23
(e) 5 (f) 20 (g) 3 (h) Rs. 5
10. (a) 2 (b) 4 (c) 0 (d) 5

(e) 2 (f) 4 (g) 1 (h) 11
(i) 5 (j)10 (k) 1 (l) Rs. 225

11. (a) 1 (b) 4 (c) 1 (d) 13
(e) 3 (f) 12 (g) 1 (h) 11
(i) 2 (j) 8 (k) 3 (l) Rs.132

12. (a) 1 (b) 5 (c) 2 (d) 22
(e) 4 (f) 20 (g) 2 (h)21
(i) 4 (j) 20 (k) 1 (l) Rs.144

13. (a) 1 (b) 6 (c) 0 (d) 3
(e) 0 (f) 0 (g) 0 (h) 31
(i) 5 (j) 30 (k) 1 (l) Rs. 105

14. (a) 0 (b) 0 (c) 3 (d) 34
(e) 3 (f) 27 (g) 7 (h) 71
(i) 7 (j) 63 (k) 8 (l) Rs.37

15. (a) 1 (b) 8 (c) 0 (d) 4
(e) 0 (f) 0 (g) 4 (h) 43
(i) 5 (j) 40 (k) 3 (l) Rs. 105

Exercise 6.4

1. 6 trays 2. Rs. 100 3. 11students
4. Yes, he needs Rs.48 and he has Rs.50 5. 6 6. 20

Exercise 8.1

6. (a) Rs. 3.35 (b) Rs. 7.50 (c) Rs. 4.05 (d) Rs.100.00
7. (a) Rs. 46 (b) Rs.19 (c) Rs. 105
8. Rs. 24
9. (a)Rs. 27.50 (b) Rs. 22.50
10. Rs. 75
11. (a) Rs. 34 (b) Rs. 66
12. (a) Rs. 3 (b) Rs.12
13. (a) Rs. 48 (b) Rs. 8 (c) Rs. 4 (d) Rs.40

Exercise 9.1

4. (a) cm (b) m (c) cm (d) cm (e) cm (f) m
5. (a) 4 (b) 7 (c) 6 (d) 8 (e) 4 (f) 1
11. B 12. B 13. A 14. 200

Exercise 9.2

1. (a) 935 m and 80 cm (b) 5 m (c) 42 m and 15 cm

(d) 302 m and 20 cm

2. (a) 526 m and 44 cm (b) 2 m and 55 cm
(c) 3 m and 70 cm (d) 8 m and 80 cm
(e) 184 m and 80 cm

3. 24 m 4. 745 m 5. 4 m 6. $\frac{3}{4}$ m or 75 cm

Exercise 10.1

3. (a) g (b) kg (c) g (d) kg
(e) kg (f) g

6. (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{3}{4}$

7. (a) Rs. 32 (b) Rs. 8 (c) Rs. 4

8. (a) Rs. 20 (b) Rs. 40 (c) Rs. 10 (d) Rs. 5

9. (a) 400 g (b) 600 g (c) 1 kg 800 g (d) 3 kg

Exercise 10.2

1. 1,000 g 2. (a) 5,000 g (b) 3,400 g (c) 1400 g

3. (a) $\frac{1}{4}$kg (b) $\frac{1}{4}$kg

4. (a) 4 kg (b) 7 kg and 600 g (c) 2kg and 60 g (d) 2 kg and 5 g

5. (a) 750 g (b) 450 g (c) 775 kg (d) 6 kg 200 g

6. (a) 3 kg 250 g (b) 16 kg 700 g

7. 4 kg 8. 800 g 9. 118 kg 500 g 10. 1035 kg

Exercise 11.1

11. (a) 500 *ml* (b) 100 *ml* and 50 *ml*
(c) 1 *l* and 500 *ml* (d) 200 *ml* and 50 *ml*
(e) use 200 *ml* twice
(f) 2 *l*, 1 *l* ,500 *ml*, 200 *ml* and 50 *ml*

12. (a) First pour 3 *l* and then 1 *l*
(b) First pour 5 *l* and then pour back 2 *l*
(c) Pour 1 *l* 4 times
(d) Pour 2 *l* twice and then 1 *l*

13. (a) $\frac{1}{2}$ *l* (b) $\frac{1}{4}$ *l*

14. (a) Rs. 32 (b) Rs. 8 (c) Rs. 4

15. (a) Rs. 64 (b) Rs. 8 (c) Rs. 16

16. (a) 488 *l* (b) 289 *l* (c) 898 *l*

Exercise 11.2

1. (a) 5 *l* (b) 1 *l* and 500 *ml* (c) 4 *l* and 50 *ml*
2. 1000 *ml* (b) 5,000 *ml* (c) 1,500 *ml* (d) 3,200 *ml*
3. (a) 488 *l* (b) 289 *l* (c) 898 *l*
4. (a) 12,32 *l* (b) 764 *l* 200 *ml*
5. (a) 513 *l* (b) 414 *l* 750 *ml*
6. (a) Use 2 *l* and 1 l
   (b) Use 2 *l* twice and 1 *l* once
7. 31 *l* 8. 1 *l* and 300 m*l* 9. 368 *l* 10. (a) 40 *l* (b) 25 *l*

Exercise 12.1

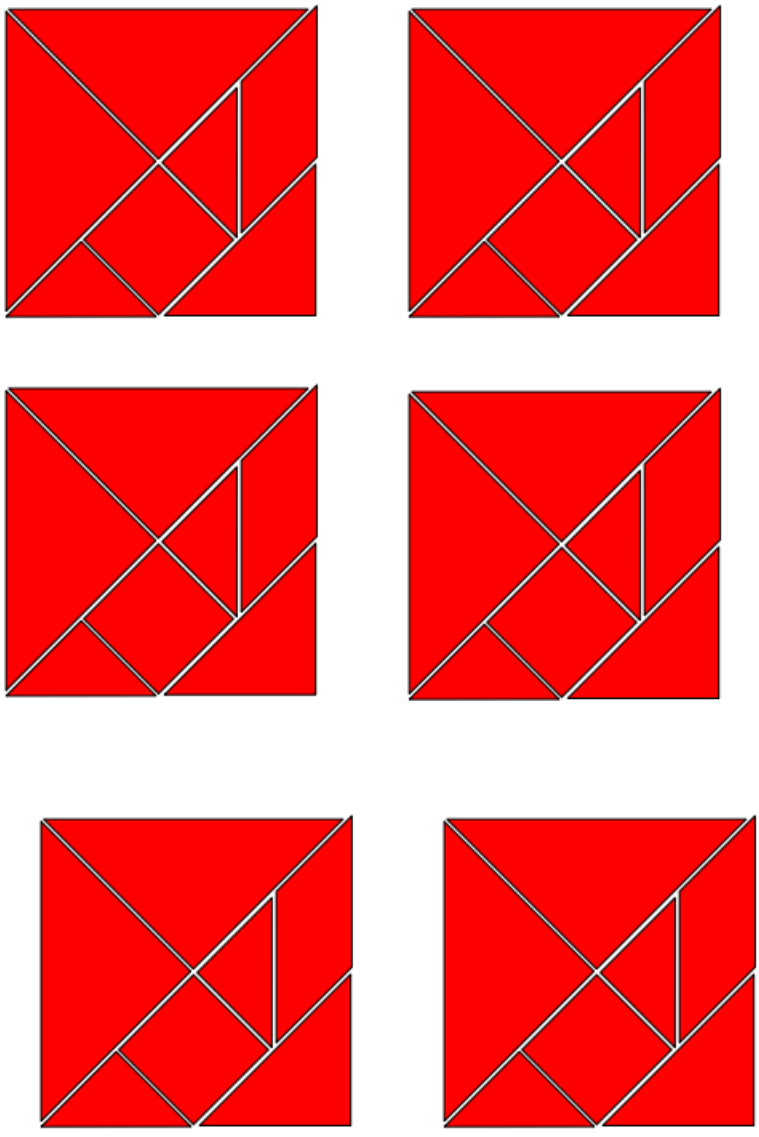
1. (a) 7:20 (b) 4:40 (c) 12 o' clock (d) 10:12
   (e) 7:14 (f) 9:15
2. (a) 10 minutes past 4
   (b) Half past 5, 30 minutes past 5
   (c) 45 minutes past 8, 15 minutes to 9, quarter to 9
   (d) 15 minutes past 5, 45 minutes to 6, quarter past 5
3. (a) (i) 4 (ii) 12 (b) (i) mid way between 5 and 6(ii) 6
   (c) (i) between 8 and 9 (ii) 9
   (d) (i) between 8 and 9 (ii) second dot after 6
5. (a) 4:30 (b) 7 o' clock (c) 3:45 (d) 11:13
6. (a) 9:45 (b) 2:15 (c) 9:30 (d) 6:37
7. (a) a.m. (b) a.m. (c) p.m. (d) p.m.
8. (a) a.m. (b) p.m. (c) p.m. (d) a.m.

Exercise 12.2

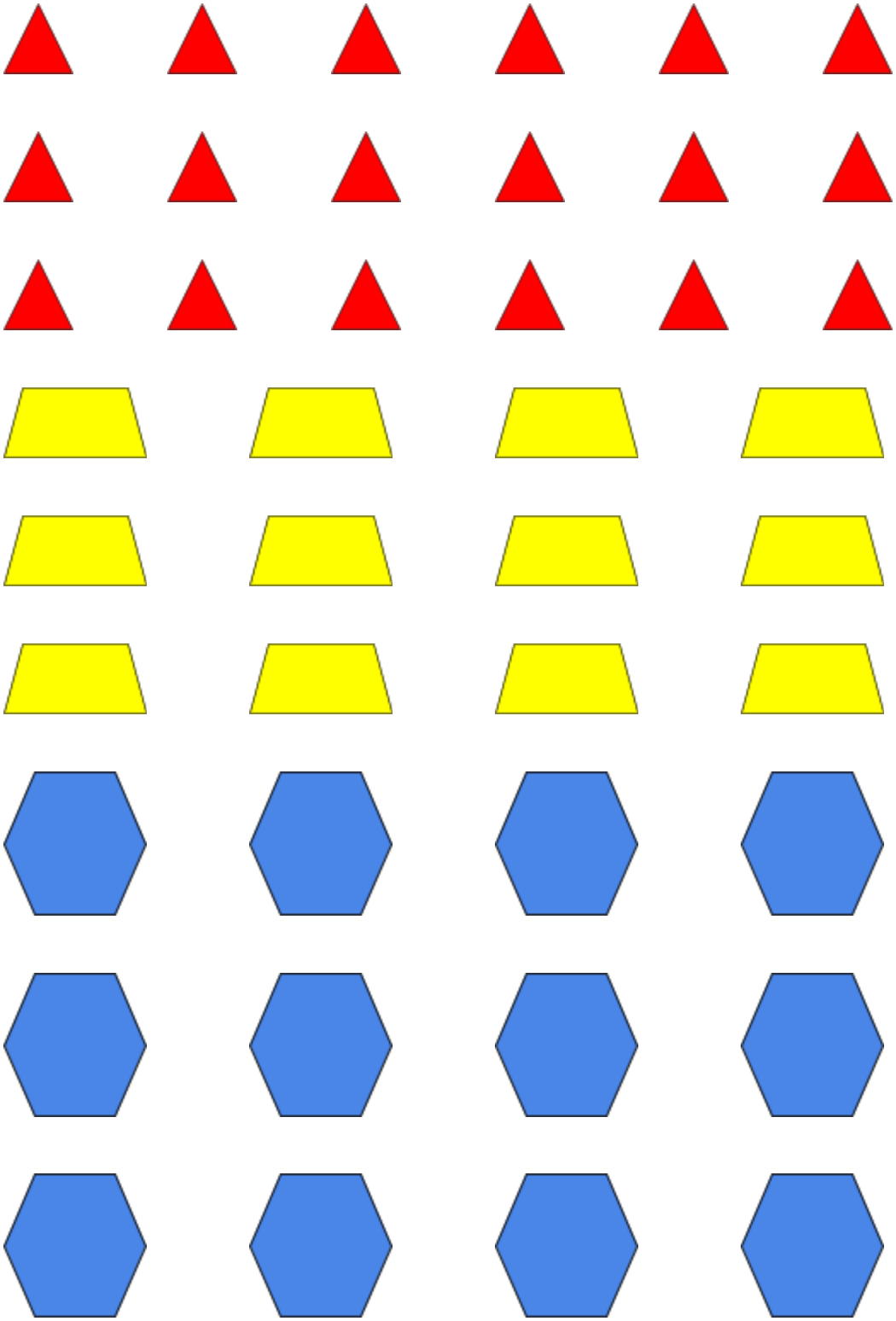
1. (a) 5:40 a.m. (b) 5:20 p.m. (c) 9:55 p.m. (d) 12:40 p.m.
2. (a) 5:30 a.m. (b) 11:40 p.m. (c) 8:45 p.m. (d) 11:30 a.m.
3. 27 minutes 4. 9 hours and 30 minutes 5. 1 hour 20 minutes
6. 8:15 p.m. 10. (a) 31 days (b) 31 days (c) 30 days
14. Ninth 15 Sunday 18. 8 days 19. 25 days
20. 3rd January

ACTIVITY SHEETS

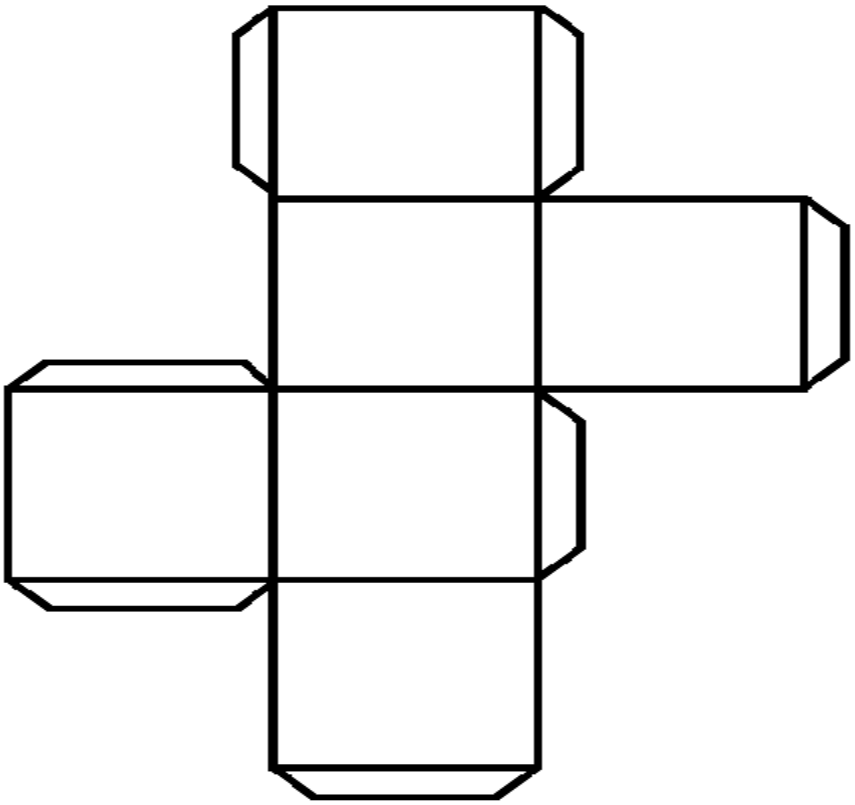
Activity Sheet 3.1-Tangrams



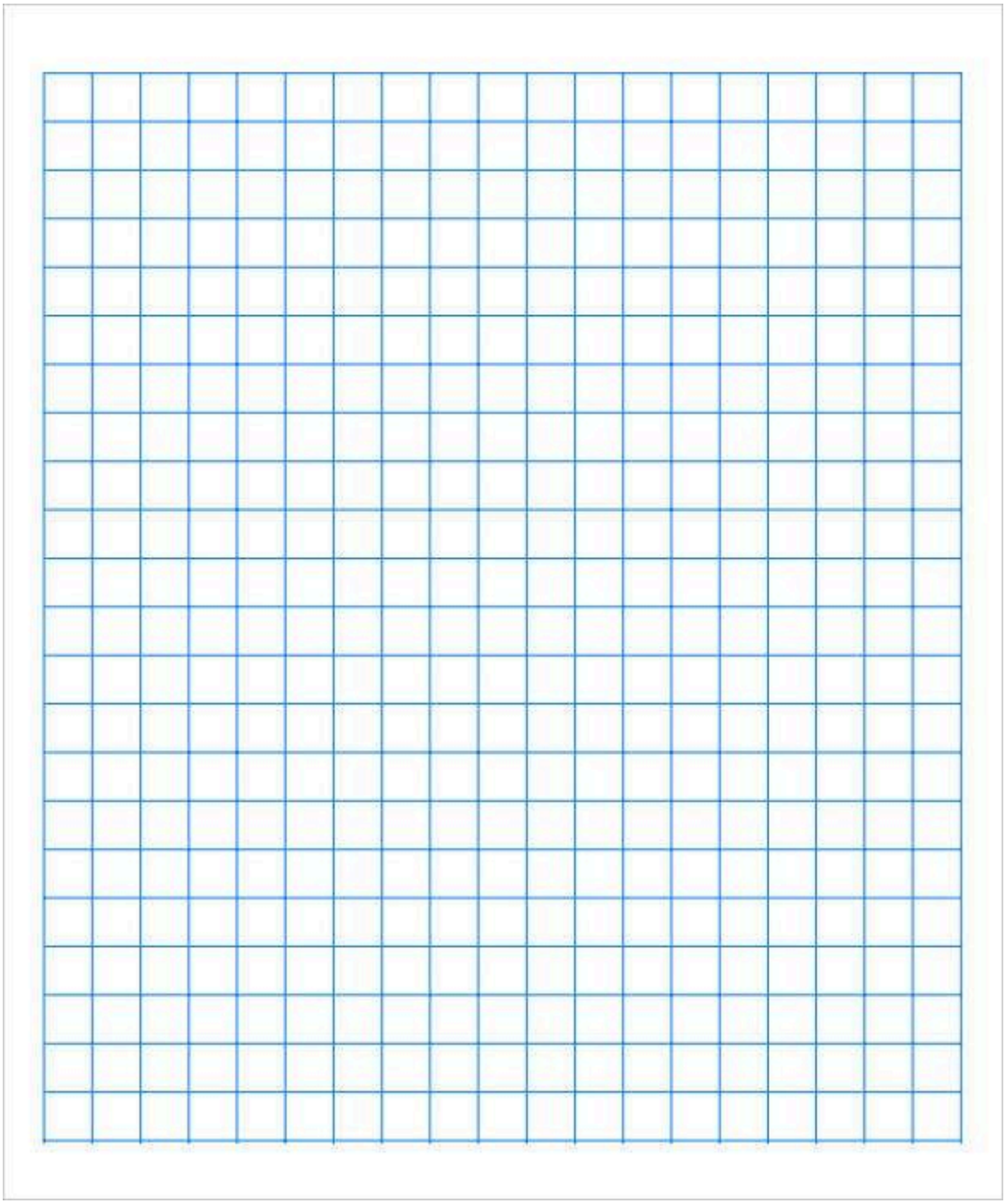
Activity Sheet 3.2



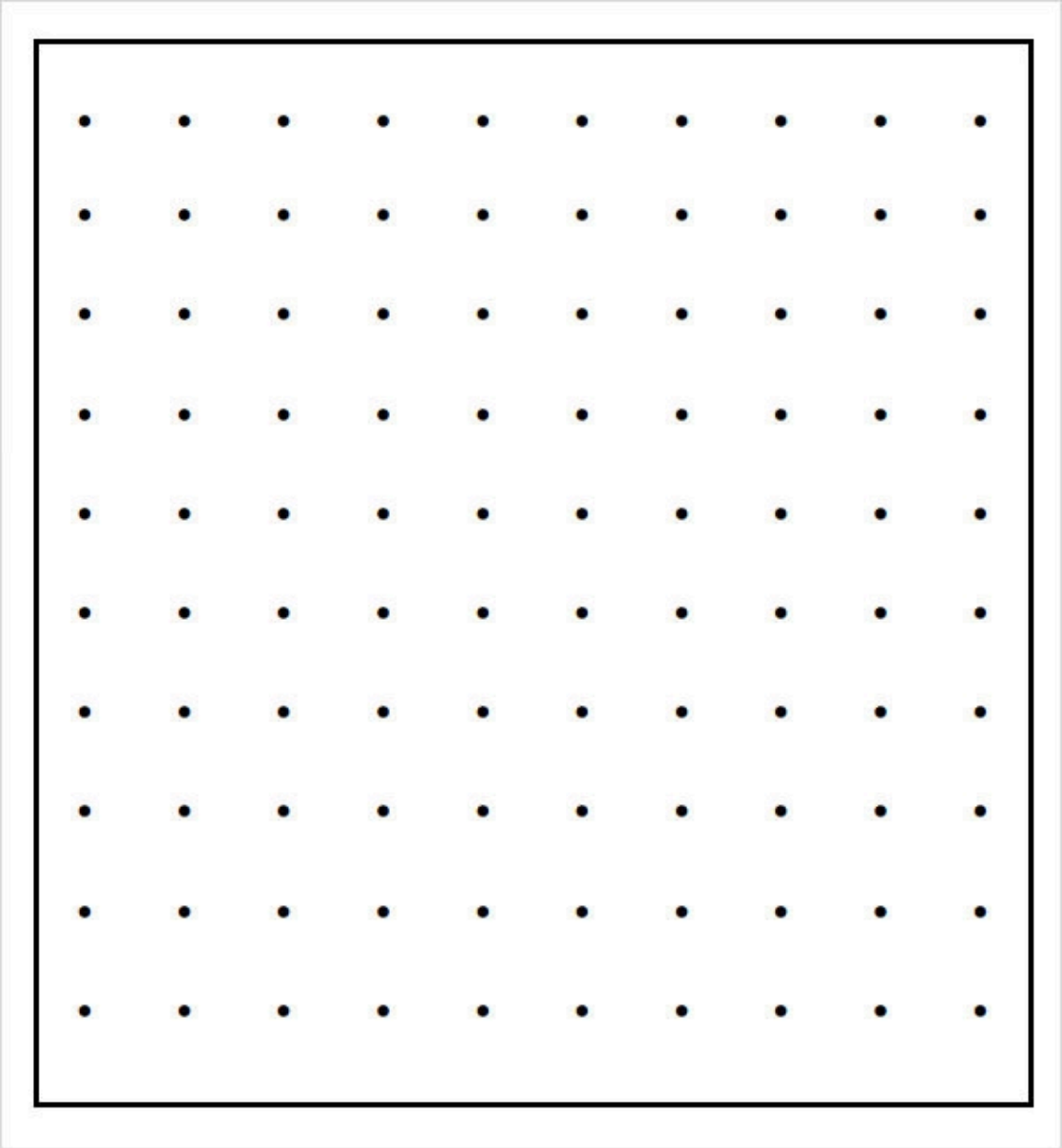
Activity Sheet 3.3-Net of a Cube



Activity Sheet 3.4-Graph Paper

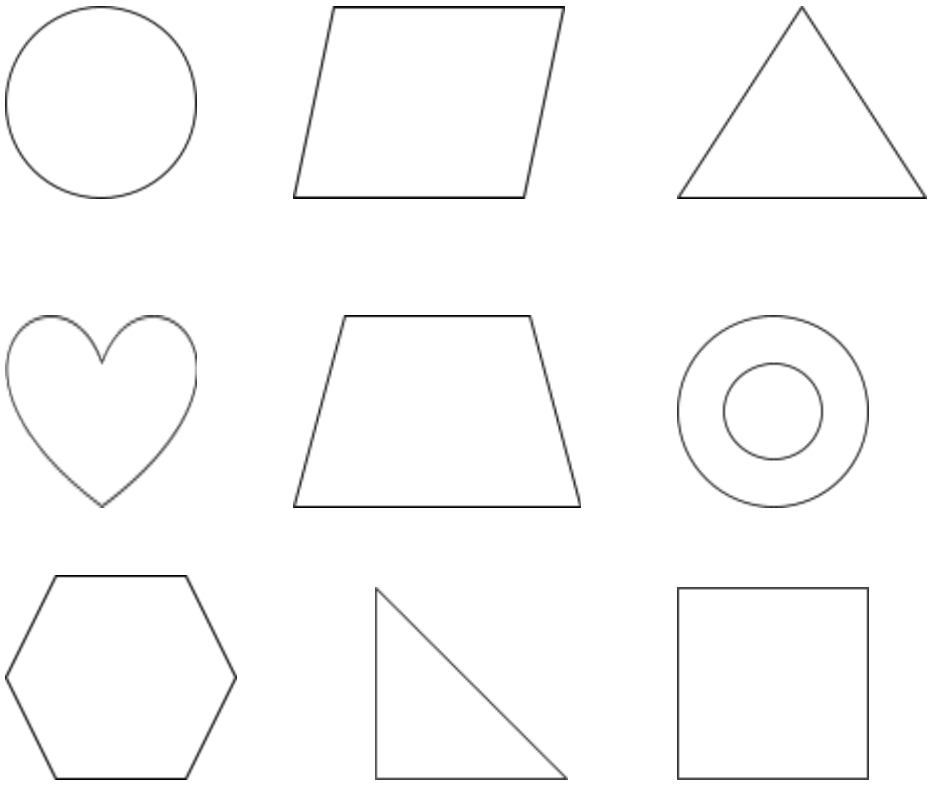


Activity Sheet 3.5-Dot Paper

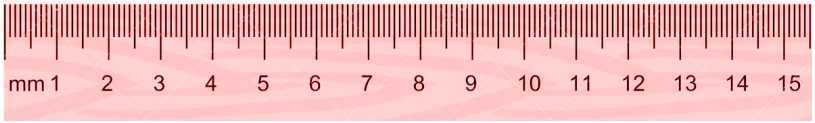


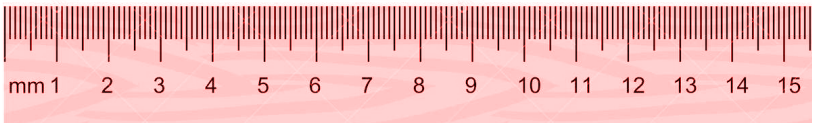
Activity Sheet 6.1

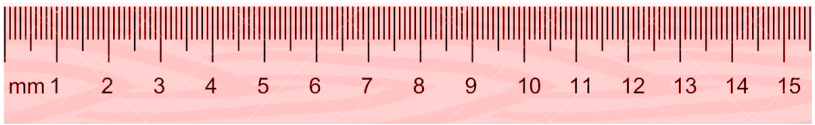
Activity Sheet 6.2

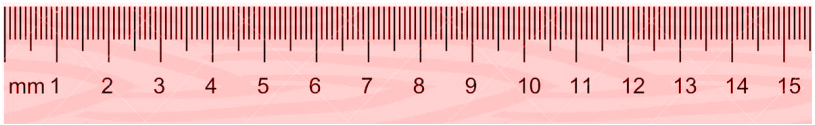


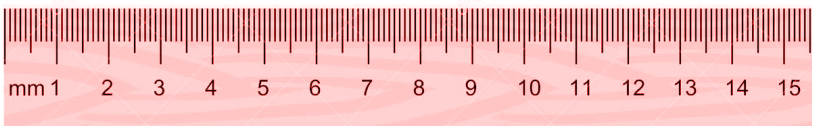
Activity sheet 8

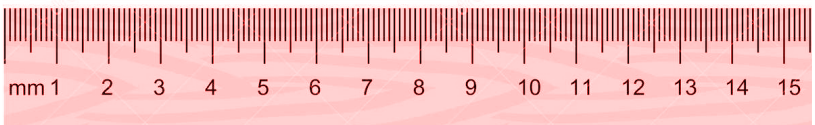




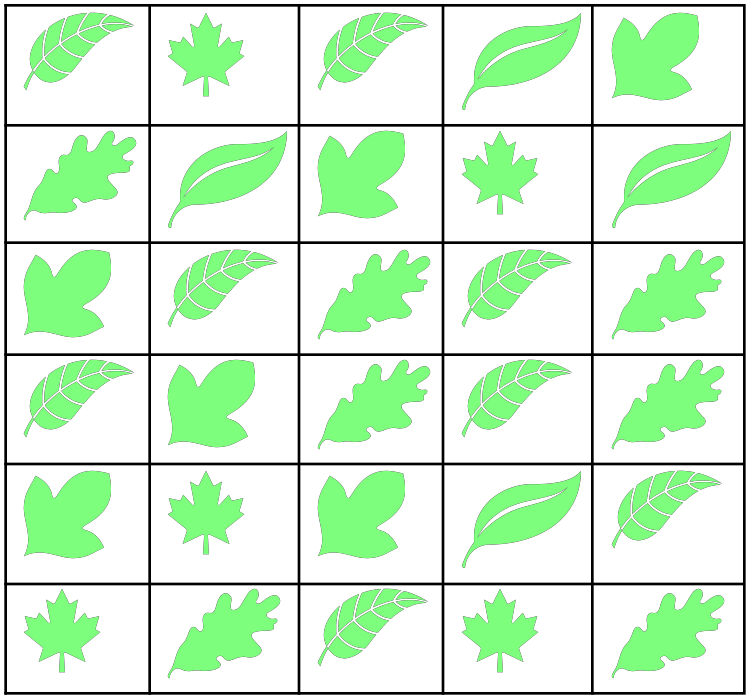








Activity Sheet 13



APPENDICES

Appendix 1-Pretest in Numbers 1-1000

1. Read the following numbers:
   6, 9, 34, 47, 149, 150, 63
2. Write all the numbers in order from
   25 to 31
   308 to 312
   494 to 504
   789 to 794
3. Write the following numbers in figures:
   (a) Forty-seven
   (b) Four
   (c) Six hundred thirty-four
   (d) Eight hundred fifty-six
   (e) Seven hundred
   (f) Three hundred four
4. Write the following numbers in words:
   (a) 6
   (b) 8
   (c) 46
   (d) 50
   (e) 487
   (f) 308
   (g) 561
   (h) 709
5. Write the following numbers (to be dictated by the teacher):
   3, 0, 57, 39, 267, 462, 999, 406, 108, 900
6. What comes just after the following numbers?
   (a) 99
   (b) 578
   (c) 409

(d) 589
(e) 999

7. What comes just before the following numbers?
   (a) 36
   (b) 50
   (c) 100
   (d) 490
   (e) 500
   (g) 1000
8. Compare the following numbers by writing >, <, or = on the line between numbers:
   (a) 9 ____ 5
   (b) 46 ____73
   (c) 67 ____9
   (d) 56 ____54
   (e) 234 ____561
   (f) 568 ____562
   (g) 85 _____103
9. Arrange the following numbers from smallest to largest:
   (a) 87, 62, 980
   (b) 453, 789, 321
   (c) 600, 783, 123, 604
10. Arrange the following numbers from largest to smallest:
    (a) 69, 84, 32
    (b) 456, 739, 241
    (c) 67, 843, 498, 972
11. Expanded forms of some numbers are given below write the numbers in
    standard form.
    (a) 6 hundreds + 5 tens + 2 ones
    (b) 4 hundreds + 0 tens + 8 ones
    (c) 9 hundreds + 0 tens + 0 ones
12. Write the following numbers in expanded form:
    (a) 583 = ___hundreds + ___ tens + ___ ones
    (b) 958 = ___hundreds + ___ tens + ___ ones

(c) 807 = ___hundreds + ___ tens + ___ ones

(d) 600 = ___hundreds + ___ tens + ___ ones

13. Write the place value of the underlined digit in the following numbers:

(a) 4<u>7</u>

(b) 5<u>8</u>3

(c) 69<u>3</u>

(d) 4<u>0</u>6

14. Write the name of the place of digit coloured red in the numbers given

Below:

(a) 4<u>6</u>3

(b) 78<u>0</u>

(c) <u>8</u>39

(d) <u>5</u>67

Appendix 2-Hundred Table

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Appendix 3-Multiplication Table

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81